PB-228 633

THE ECONOMIC IMPACT OF THE CAPITAL OUTLAYS REQUIRED TO ATTAIN THE WATER QUALITY STANDARDS OF THE FEDERAL WATER POLLUTION CONTROL ACT

Eastman Dillon, Union Securities and
Company

Prepared for:

Federal Water Pollution Control Administration

8 January 1968

DISTRIBUTED BY:

NTIS
National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 228 633

THE ECONOMIC IMPACT OF THE CAPITAL [illegible]
REQUIRED TO ATTAIN THE WATER QUALITY STA[illegible]
OF THE FEDERAL WATER POLLUTION CONT[illegible]

A Study Prepared pursuant to Contract No. 14-12-[illegible]

for the [illegible]

United States Department of the Interior

Federal Water Pollution Control Administration

Eastman Dillon, Union Securities & Co.

New York, New York

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

EASTMAN DILLON, UNION SECURITIES & CO.
MEMBERS NEW YORK STOCK EXCHANGE
One Chase Manhattan Plaza
New York, N.Y. 10005

BALTIMORE
BOSTON
CHICAGO
CLEVELAND
DALLAS
HARTFORD
LOS ANGELES
NEWARK
PHILADELPHIA
SAN DIEGO
SAN FRANCISCO
WASHINGTON, D. C.

CABLE ADDRESS
EASTUNION

TELEPHONE
AREA CODE 212
770-8000

January 8, 1968

Mr. James M. Quigley
Commissioner
Federal Water Pollution Control Administration
U.S. Department of the Interior
Washington, D.C., 20242

Dear Mr. Quigley:

Transmitted herewith is a study entitled The Economic Impact of the Capital Outlays Required to Attain the Water Quality Standards of the Federal Water Pollution Control Act, prepared pursuant to Contract No. 14-12-142, dated October 18, 1967.

begin → The study presents and evaluates the available data dealing with the requirements of State and local governments to achieve the standards of the Federal Water Pollution Control Administration program; it places the program in its perspective relative to other, competing issues confronting the affected units of government; and it appraises the major financial and legal problems which will be encountered in implementing the attendant standards.

The study was directed by Mr. W. James Lopp II of our firm. Substantive portions of the report were contributed by Robert R. Nathan Associates, Inc., Consulting Economists, Washington, D.C., and Nixon Mudge Rose Guthrie Alexander & Mitchell, Attorneys at Law, New York, New York. Additional assistance was provided at our request by Kutak, Rock & Campbell, Attorneys at Law, Omaha, Nebraska.

Eastman Dillon, Union Securities & Co. wishes to express its appreciation to Dr. James J. Flannery, Project Officer, Federal Water Pollution Control Administration, and to other members of your staff for their complete cooperation and helpful suggestions in the preparation of this study. Our firm assumes full responsibility, of course, for the contents of the study.

Sincerely yours,

EASTMAN DILLON, UNION SECURITIES & CO.

George W. Bramhall

George W. Bramhall, General Partner

ib

THE ECONOMIC IMPACT OF THE CAPITAL OUTLAYS REQUIRED TO ATTAIN THE WASTE WATER QUALITY STANDARDS OF THE FEDERAL WATER POLLUTION CONTROL ACT

Prepared for

United States Department of the Interior
Federal Water Pollution Control Administration

Eastman Dillon, Union Securities & Co.
New York, N. Y.

in association with

Robert R. Nathan Associates, Inc.
Washington, D. C.

and

Nixon Mudge Rose Guthrie Alexander & Mitchell
New York, New York

January 8, 1968

id

CONTENTS

Page

INTRODUCTION.. 1

Summary of Findings........................... 9

I. REQUIRED CAPITAL OUTLAYS: REQUIREMENTS FOR STATE AND LOCAL FINANCING ASSUMING VARYING LEVELS OF FEDERAL AID................. 17

Requirements of the Program................... 19
Requirements by State......................... 24
Capital Requirements by Community Size........ 27
Construction Cost Increases................... 29
Effects of Delays on Costs.................... 34
Prospective on Requirements................... 35
Federal and State Assistance: Components and Amounts............................. 37

II. THE ABILITY OF STATE AND LOCAL GOVERNMENTS TO FINANCE REQUIRED CAPITAL OUTLAYS........... 46

Sources of Financing Capital Outlays.......... 47
Supply of and Demand for Municipal Obligations............................. 55
Patterns of the Municipal Securities Market.................................. 58
The Prospects for Required Capital Outlays by State and Local Governments............ 69

III. LEGAL CONSTRAINTS UPON STATE AND LOCAL GOVERNMENTS IN FINANCING REQUIRED CAPITAL OUTLAYS...................... 88

The States.................................... 89
Local Governments............................. 94

CONTENTS (continued)

APPENDIX I - TECHNICAL NOTES...................... 104

Statement of the Limitations of Data Provided in the FWPCA Cost Estimate Study.................................... 105
Methodology Employed in Projecting Construction Cost Increases................ 108
Sources of Data and Assumptions in the JEC Series B Forecasts................. 109
Federal Grants for Sanitary Sewers ans Waste Treatment Facilities Through Agencies Other Than Federal Water Pollution Control Administration........... 112

APPENDIX II - GENERAL NOTES....................... 115

The Omaha Pollution Control Corporation....... 116
Trends in Municipal Bond Holdings............. 120
Analysis of Public Borrowings................. 129

APPENDIX III - STATE BY STATE ANALYSIS OF FOND ISSUES FOR SEWER AND WASTE TREATMENT FACILITIES....................... 148

APPENDIX IV - TABLES.............................. 202

INTRODUCTION

The need for an effective water pollution control program daily becomes more urgent. Facilities are inadequate for the collection and treatment of the sewage and waste water of our present population and industry. The resulting pollution of our rivers, streams, and lakes has reached intolerable levels. This present urgency is compounded by the growth of population which, according to median estimates of the U. S. Bureau of the Census, will increase from 200 million in 1967 to 235 million in 1980, and to 308 million by the year 2000. With this indicated growth of population and the commensurate growth in industrial activity, America faces a water pollution crisis unless accelerated action is immediately undertaken.

The occasion for this report is the requirement of the Federal Water Pollution Control Act, as amended, that the Secretary of the Interior --

> ...make a comprehensive study of the *economic impact* of affected units of government of the cost of installation of treatment facilities; and a comprehensive analysis of the national requirements for and the cost of treating municipal, industrial, and other effluent to attain such water quality standards as established pursuant to this Act or applicable State law. The Secretary shall submit such detailed estimate and such comprehensive study of such cost for the five-year period beginning July 1, 1968. [Italics supplied]

The attainment of clean water goals is not a technical or physical resource problem--what needs to be done and how to do it are well known. The basic problem is that of mobilizing the financial resources required. This problem is particularly acute at the State and local levels of government where the financing responsibility primarily rests.

By agreement with the Federal Water Pollution Control Administration (FWPCA), "economic impact"--the subject of this study--means both the measurement of the dollar amounts required by the State and local governments to finance their share of the program for meeting water quality standards, and an evaluation of their ability to provide such outlays. The term economic impact does not include a judgment of the benefits to society arising from the program or of the social costs of failure to implement it. Those judgments were presumably made by the Executive Branch when it recommended to the Congress and to the Nation that a water pollution control program be undertaken, and by the Congress when it authorized the program.

The costs to State and local governments of meeting their share of the program can readily be measured. FWPCA estimates indicate that over $8 billion are needed between 1969 and 1973 for the construction of sewage treatment plants to meet water quality standards. An additional sum of nearly $7 billion is needed for sanitary collection sewers. While these collection sewer costs cannot be considered a part of the direct costs of water pollution control, they do involve necessary expenditures for waste disposal by the communities involved. The cost of separating storm and sanitary sewers is not covered in these figures, nor are debt service or operating costs. The Federal Water Pollution Control Act authorizes the Federal government to provide $3.5 billion of the total capital cost of waste treatment facilities. Minor additional sums are available for sewers and waste treatment facilities under other legislation. With the exception of that portion which may be privately undertaken, the balance must be met by State and local governments. If the Federal Government provides the fully authorized amount of $3.5 billion, State and local governments will have to fund $4.7 billion for the rest of the waste treatment program. If the sanitary collection sewer costs are included, the total cost will be $11.4 billion, or more than twice the amount invested during the period 1962-66. If the Federal government funds less than $3.5 billion, the costs to other government entities will rise commensurately.

The question inevitably occurs: To what extent will the ability and willingness of the State and local governments to fund their share of the program be affected if the Federal government does not finance the program as authorized in the Act? Federal funds are intended to act as a magnet to draw contributions from State and local governments. The Federal government can provide up to 30 per cent of the costs of urban waste treatment facilities without requiring contributions from the State governments. However, the Federal government can increase its contribution to a maximum of 55 per cent if State governments provide at least 25 per cent of the costs and meet certain other conditions. Thus, with a possible 80 per cent covered by the Federal and State governments, local governments need provide only 20 per cent of the financing. Conversely, if the Federal contribution is not forthcoming, the State contribution may lag, and the incentive to local governments may diminish.

It should not be concluded that a partial, or even total, shortfall in the Federal contribution to this program necessarily prevents its implementation. There is no fixed limit on the capacity of State and local governments to raise or borrow additional funds to meet compelling public purposes. This capacity will vary sharply among the different States and communities. Further, community priorities can shift--past inattention to pollution may be replaced by priority claims on public funds.

There are, however, serious constraints on what these communities can do. Some entities of government face serious legal limits on their authority to borrow, either through general purpose or through revenue bonds. In many areas, national programs for assuring clean water require actions that cross jurisdictional lines, and it is a complex matter--for legal and other reasons--to develop comprehensive programs which embrace multiple units of government. This problem arises particularly for residents and industries in the areas peripheral to cities that are, however, not rural.

There is, moreover, no doubt that these communities can come to rely on user charges both for capital costs and current costs, particularly those levied on industries that are major contributors to the pollution problems. The fixing of equitable user charges is a difficult and controversial matter. It may be particularly costly to build sewers to carry wastes long distances, and population densities may be so low as to make per capita costs prohibitively high. The FWPCA estimates that the per capita cost of primary treatment plants is five times as high for cities of 1,000 or less as it is in cities of 100,000 or more. This cost differential is attributable to differences in unit costs and size effects, i.e., economies of scale.

We cannot overlook the fact that the sharp rise in the demands of the water pollution control program comes at an extraordinarily complex time in national life. Public needs exceed any experiences before, and priorities are shifting radically: Clean water must compete with housing, poverty programs, urban renewal, public health, public transportation, education, and the requirements of Vietnam. Still, certain very costly programs that captured public priorities in the 1960's--roads and education in particular--may be making reduced demands on the public funds in the early 1970's. Some latitude should exist, therefore, to meet needs neglected or deferred in the past.

All levels of government will face these unprecedented fiscal needs while encountering record high interest costs. Clearly, some programs which the public recognizes as essential will be left undone, postponed, or cut back. The Congress and State and local governments are making serious efforts to limit outlays. For fiscal year 1968, the Congress has appropriated only $200 million for clean water measures, compared with the $450 million authorized just two years ago. Postponement will ultimately prove more costly because programs curtailed today will still have to be implemented, but at tomorrow's higher costs.

These factors suggest the complexity of judging the impact on State and local governments of assuring by 1973 the water quality standards called for by the Congress. It can only be said that if the State and local governments are prepared to grant the clean water program extremely high priority and, if necessary, to deprive other essential programs of funds, then water quality standards can be achieved reasonably on schedule. There will be opposition. Advocates of education, roads, health, and housing will not lightly set aside their demands for those of clean water. Moreover, legislatures move slowly in changing constitutions and in passing laws such as those that would permit clean water programs to find their own financing through such devices as revenue bonds and creation of special water pollution control districts.

It should be noted, however, that the increases in costs needed to control water pollution are not unparalleled for State and local governments. In roads and eduction, outlays in excess of the amounts called for by water pollution control measures in the forthcoming period have increased in past years just as rapidly.

This report did not attempt to forecast the public mind or action. It will identify problems, which vary from one

State to another, offer perspectives on costs and on financing, and point the way towards needed action.

Chapter I of this report presents and evaluates data on needs by States and by communities of varying size. It indicates past rates of expenditures and future requirements for water pollution control, and the implications for the program and for the communities of varying Federal contributions. In Chapter II, past sources of financing and reliance on general revenues, borrowing, and Federal grants to meet public needs are described. The ability of the affected governments to finance the required outlays in the future is evaluated.

Chapter II provides perspective on the extent to which State and local borrowings and Federal grants are necessary if capital needs for the 1970's are to be met. It also provides a profile of past borrowings by State and local governments and by other public authorities--special districts for example--to meet water needs and general purposes. The holders of bonds, the interest rates paid, the security offered, the size of communities involved, and other relevant factors are discussed. Judgments are offered as to the capacity of communities to incur debts for water purposes well beyond those previously experienced, in both absolute and percentage terms.

Finally, Chapter III describes the legal capacities of and constraints on State and local governments to borrow for general purposes, of which water pollution control measures may be one; to borrow specifically to finance such measures; and to create special legal entities with borrowing capacity to meet water pollution control needs.

Summary of Findings

Before turning to the body of the report, it would be useful to summarize the principal findings. The underlying data and accompanying analyses are, of course, developed in the following text.

1. To achieve Federal water pollution control standards, State and local governments need to spend $8.2 billion for municipal waste treatment facilities during the period 1969-73. An additional $6.7 billion will have to be invested in the construction of sanitary sewers during that period, bringing the grand total required capital outlays to nearly $15 billion--more than three times the amount spent in 1962-66.

2. Federal grants of $3.5 billion have been authorized for construction of waste treatment facilities, but virtually no grants are available for sewers. If the full $3.5 billion were appropriated, State and local governments would have to

draw on their own funds in 1969-73 for collector sewers and waste treatment facilities at a rate more than 2-1/2 times that in 1962-66. (About $11.0 billion after allowing for privately financed construction, compared with $4.3 billion.) If appropriations for Federal grants continue 50% below authorizations, State and local governments would have to spend about $12.7 billions of their own funds, or nearly three times such expenditures in 1962-66.

3. Needed increases in the outlays over 1962-66 vary greatly among the States--from less than 50 per cent in eight states to over 350 per cent in seven states.

4. Communities of small size account for a disproportionate share of requirements. Cities of less than 25,000, which had 20 per cent of U. S. population in 1960 and 21.2 per cent of sewer bond sales 1962-66, account for 52 per cent of 1969-73 capital outlay needs for collector sewers and waste treatment facilities. Special problems will exist in the placing of municipal obligations for water pollution control facilities for small communities. Their credit ratings are usually lower--and interest rates higher--than generally prevail.

5. The required programs of construction and equipment supply can be executed without a strain on physical or manpower resources, or without abnormal increases in price. However,

delays in execution of the program will still be costly. If the program for 1969 and 1973 were phased over a ten-year period, it would cost over $1.3 billion more for construction and equipment, even if prices rise no more rapidly in the future than since 1950.

6. The needed increases in the outlays for this sector are not unprecedented. Capital outlays for highway and education programs showed even larger increases in comparable time periods, highways having increased from $20.5 billion to $35.3 billion from 1953-57 to 1960-64, and education from $14.1 billion to $20.2 billion. Substantial Federal grants, an increase from $3.8 billion to $15.0 billion, helped finance both programs.

7. The ability of the States to finance these programs must be considered in the context of the total capital needs of State and local governments and of the adequacy of investable funds for municipal bonds. A comprehensive report dealing with State and local public facility requirements and financing, prepared in 1966 for the Joint Economic Committee of the U. S. Congress, anticipated that total needs will rise from $20.1 billion in 1965 to $31.6 billion in 1970 and to $40.7 billion in 1975. Sewer and waste treatment programs historically have been only a small part of total State and local capital

expenditures. In the years 1955-65 they amounted to 5.1 per cent of such outlays--with Federal grants being insignificant.

Without Federal grants, State and local governments will have to spend 9.0 per cent of their capital budgets as estimated by the JEC for 1969-73 to meet the Federal water quality standards. Federal grants of $3.5 billion would lower the percentage to 6.9 per cent.

The problem of financing the program may be mitigated somewhat by the projected decline in the relative claims of transportation and education on public outlays as estimated by the JEC--from 68.7 per cent in 1965 to 62.6 per cent in 1975.

8. State and local governments have relied traditionally on borrowings to finance about half of their overall capital outlays. They have also used about $5 billion annually out of general revenues for capital outlays. Rising Federal grants-in-aid have accounted for an increasing share of total State and local capital outlays. If State and local borrowings remain at 50 per cent of capital outlays, if general revenues provide $5 billion annually for capital purposes as in the past years, and if Federal grants are divided equally between capital and current purposes, as seems likely from recent trends, then grants amounting to $21.9 billion in 1970 and

$31.0 billion in 1975 will be necessary. If these amounts are not forthcoming, State and local governments would have to borrow in excess of their traditional proportion of total capital outlays in order for the capital programs foreseen by the JEC to be fully realized.

9. State and local governments have traditionally relied on borrowings for by far the largest part of their financing of sewer and waste treatment facilities. Outlays amounting to an average of $3 billion annually in 1969-73 imply borrowings by State and local governments about 3-2/3 times the rate of such borrowings in 1966 ($818 million as against $2.98 billion), and 16.1 per cent of total estimated average municipal borrowings (of $18.6 billion), against 7.4 per cent of borrowings of $11.1 billion in 1966. If Federal grants of $3.5 billion are available, average annual municipal borrowings of $2.3 billion would amount to about 2-1/2 times the 1966 level.

10. The JEC Report suggests that adequate funds from the municipal bond market will be available to cover all needs for municipal borrowings in the 1970-75 period. However, the balance between supply of and demand for funds is very close, and is dependent on assumptions that commercial banks and casualty insurance companies, important holders of

municipal bonds, will take increasing shares of municipal bond offerings. If they should deemphasize municipal lending in the face of credit tightness and high yields on corporate securities, or a reduction in income tax rates the availability of adequate funds to meet municipal demands would be in jeopardy.

11. Greater reliance on user charges could reduce the need for both grants and borrowings, but significant increases in these charges in the years immediately ahead are not likely.

12. By steadily increasing the rate of interest it is theoretically possible that the increased demands upon the municipal bond market could be absorbed. However, at the higher rates of interest the economic feasibility the desired projects may be jeopardized, statutory rate limitations may be encountered, and a general reluctance by the borrower to pay such rates may be anticipated--any one event may effect a delay in the achievement of the FWPCA program in the scheduled time period. To assure a minimal impact upon required borrowings in the municipal bond market, the level of interest rates and the supply of investable funds, the availability of Federal grants at the maximum authorized level is obviously of great importance.

13. Debt service costs will run high. For local governments receiving even the most favorable grant treatment--

55 per cent Federal and 25 per cent State aid--a 4-1/2 per cent interest rate and repayment over 30 years means an annual debt service cost of $514 million after 1974. With only $3.5 billion of Federal aid, instead of the $4.5 billion implied by 55 per cent grants, debt service costs would run proportionately higher. The ability to incur debt and to handle the cost will vary from one community to another. A Federal grant program of at least $3.5 billion will encourage and help communities to incur debt burdens to control water pollution.

14. Legal restrictions at the State and local level are a major obstacle to borrowing for required capital outlays. The primary restrictions upon the States are constitutional debt limitations and referendum requirements for incurrence of debt. A further restriction is the constitutional prohibition against the loan, gift or grant of the State's credit.

15. Local governments historically have financed sewer and waste treatment facilities by the issuance of general obligation bonds secured by ad valorem taxes. However, the capacity to undertake such borrowings is limited by ceilings on such indebtedness or by referendum requirements. These limitations are eased, in some instances, by an exemption for sewerage construction, by creating special districts for the sole purpose of financing such facilities, and by the

use of revenue obligations which normally do not fall within the statutory or charter limitations of such local governments.

16. Interest rate limits and prescribed terms and conditions by which the obligations may be issued also restrict the ability to borrow. So does the requirement that the local government have on hand funds sufficient to cover the entire cost of the project prior to undertaking construction. The ability of local governments to finance such facilities is also hampered by the lack of authorization to collect standby or availability charges from properties which now, or in the future, may benefit from the facility but currently do not receive any services.

I. REQUIRED CAPITAL OUTLAYS: REQUIREMENTS FOR STATE AND LOCAL FINANCING ASSUMING VARYING LEVELS OF FEDERAL AID

The purpose of this chapter is to evaluate both the requirements of the program for the improvement of water quality standards under existing legislation and to point up the financing burdens they imply for State and local governments. The relevant legislation is the Federal Water Pollution Control Act of 1956 (Public Law 84-660 amended in 1961 by Public Law 87-88), and its subsequent amendments, the Water Quality Act of 1965 (Public Law 89-234), and the Clear Water Restoration Act of 1966 (Public Law 89-753). Altogether, these form the basis of the present Federal Water Pollution Control Administration program.

Federal construction grants relating to waste treatment facilities were first provided in 1956 by the Federal Water Pollution Control Act. The Water Quality Act of 1965 increased the available sums from $100 million to $150 million per year for the years 1966 and 1967. This Act also gave the States the option of setting water quality standards for interstate waters and to plan for the implementation and enforcement of the proposed standards. Far more extensive provision for Federal construction grants was afforded by the terms of the Clean Water Restoration Act of 1966, which amended the previous Act to authorize a total of $3.5 billion for municipal waste treatment plant construction grants, to be made available over the five-year period beginning fiscal 1967, with no limitation on the amount of an individual grant, and with the Federal share varying from 30 to 55 percent.

There is no comparable legislation which provides Federal grants for the construction of sanitary sewers. The most significant Act in this area is the Housing and Urban Development Act of 1965 (Public Law 89-117) which authorized $200 million per year during 1966-69 for improving basic water and sewer facilities. The uses to which the HUD Act funds may be used include, but are not restricted to, sanitary sewers, and are therefore not considered in this study.

Although the Acts cited above represent great contributions to the solution of water pollution problems, they do not eliminate State and local government responsibility for implementing the established standards and providing financing. Thus, the economic impact of the Federal program on the various levels of government must be evaluated. In this chapter we (1) examine the costs of the program in terms of the previous capital outlays of State and local governments for sanitary sewers and waste treatment facilities; (2) ascertain the capability of the construction and equipment industries to implement the program; (3) project increases in construction and equipment costs; (4) consider certain of the effects which would be occasioned by a program delay; (5) place the requirements in perspective in relation to competing demands and discuss changes in emphasis in government outlays that would affect the ability of State and local governments to finance outlays for water quality; and (6) measure the extent to which the participation of the Federal and State governments, through grant funds available for assistance, could relieve the financial burden on the local communities.

Requirements of the Program

FWPCA has prepared a cost estimate study of the program on a State-by-State basis. The material contained therein has formed the primary body of information for this present study.1/ According to these data, nearly $15.0 billion2/

will have to be invested in waste treatment facilities and sanitary sewers during the five-year period ending mid-1973 to attain the quality standards which have been established. This figure refers to capital investments only, and excludes debt service, maintenance, and operational charges, which will have to be reckoned as additional requirements. This also excludes costs of separation of storm and waste sewers. A recent study prepared for FWPCA estimates that the costs of such separation may run to nearly $49 billion, more than three times the costs of collection and treatment of wastes.[3]

That this program is a prodigious undertaking can be seen by comparing the requirements with the actual investments in such facilities during the five-year period ending in 1966. Outlays from 1961-66 totaled about $5.3 billion; the proposed requirements, adjusted for construction cost increases, call for an investment of nearly three times that amount (table 1 and figure 1).

1/ A statement, noting the limitations of the cost data on which the cost estimate study was based, has been prepared by FWPCA and is contained below as Technical Note 1 in Appendix I.
2/ The equivalent of $13.6 billion in constant 1968 dollars, as measured by the FWPCA. The methodology employed in adjusting the data to a current dollar basis is described in Technical Note 2, Appendix I.
3/ American Public Works Associations, The Problems of Combined Sewer Facilities and Overflows in U.S. Communities, prepared for Federal Water Pollution Control Administration, Chicago, 1967.

Table 1. Total United States Sanitary Sewers And Municipal Waste Treatment Facilities

Construction Contract Awards, 1962-66
vs.
Required Capital Outlays, 1969-73
(in million current dollars)

Item	Sanitary Sewers			Treatment plants[a]	Total
	Public[a]	Private[b]	Total		
Construction contract awards:[c]					
1962............	320.5	131.0	451.5	545.2	996.7
1963............	404.4	136.0	540.4	679.2	1,219.6
1964............	395.6	130.0	525.6	513.4	1,039.0
1965............	356.3	128.0	484.3	522.6	1,006.9
1966 (prelim.)..	401.2	109.0*	510.2	554.7	1,064.9
5-year total...	1,878.0	634.0	2,512.0	2,815.1	5,327.1
	375.6	126.8	502.4	563.0	1,065.4
Annual average					
Required capital outlays:[c]					
1969............			1,267.7	1,480.8	2,748.5
1970............			1,306.4	1,553.6	2,860.0
1971............			1,344.2	1,633.6	2,977.8
1972............			1,385.1	1,721.5	3,106.6
1973............			1,430.2	1,816.0	3,246.2
5-year total...			6,733.6	8,205.5	14,939.1
Annual Average			1,346.7	1,641.1	2,987.8

continued

Table 1. Continued -- Total United States Sanitary Sewers And Municipal Waste Treatment Facilities

---

*Estimated

a/ Source: U.S. Department of Interior, Federal Water Pollution Control Administration, WP-15 series publications, Table 4.

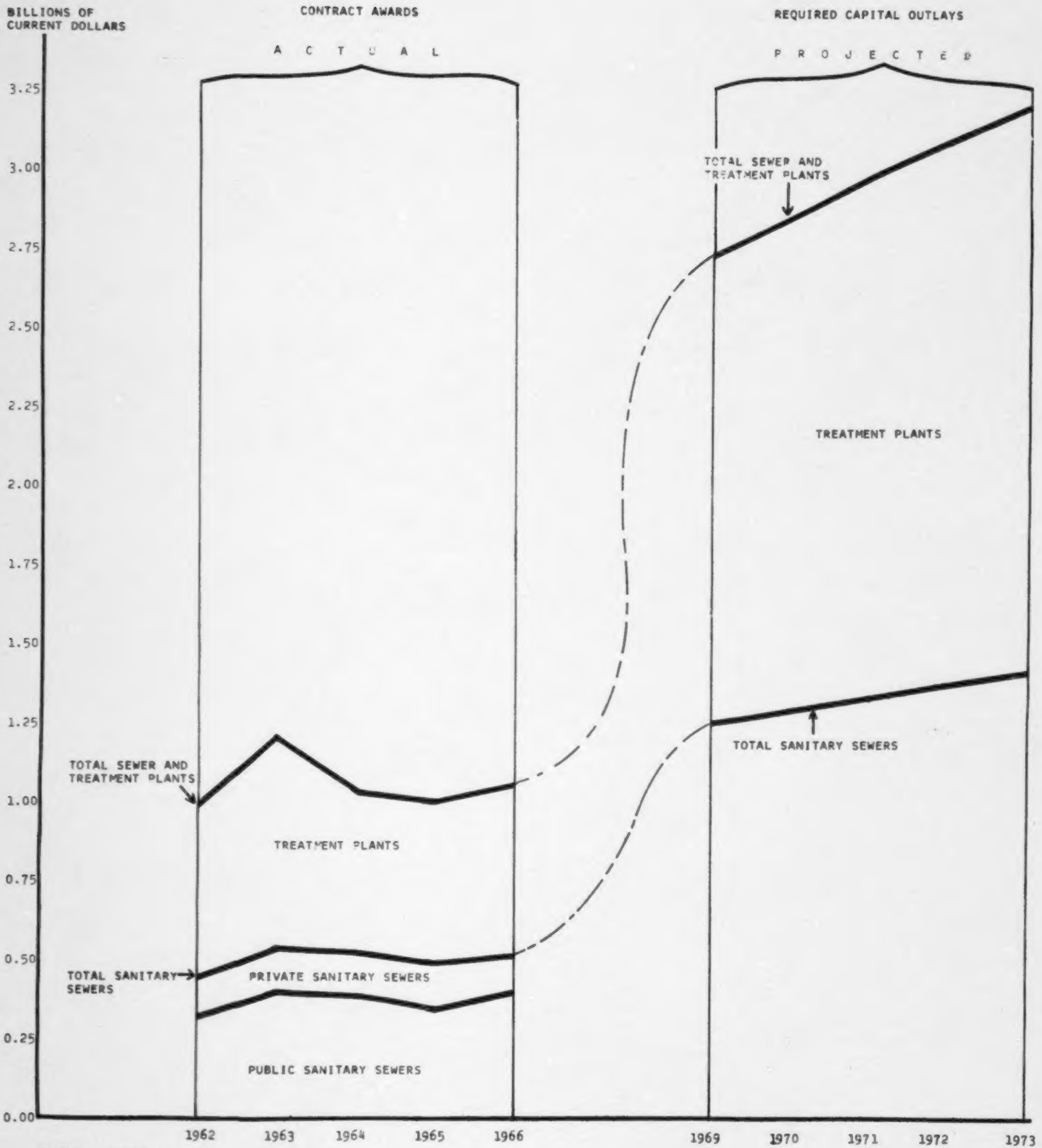
b/ Source: U.S. Congress, Joint Economic Committee, State and Local Public Facility Needs and Financing, 89th Congress, 2nd Session, 1966, Vol. I, p. 147.

c/ Source: U.S. Department of Interior, FWPCA, unpublished data, with scheduled annual required capital outlays in constant dollars adjusted to current dollars on the basis of projected construction cost increases.

Figure 1

SANITARY SEWERS AND WASTE TREATMENT FACILITIES
TOTAL UNITED STATES

CONTRACT AWARDS VS REQUIRED CAPITAL OUTLAYS
IN CURRENT DOLLARS



SOURCE: TABLE 1

Requirements by State

The national totals are an aggregate of widely varying State requirements. These have been determined by the FWPCA through assessment of the requirements of each State for provision of adequate sewers and waste treatment facilities for urban populations presently provided with inadequate facilities, and provision for anticipated increases in each State's urban population. Annual State-by-State comparisons, shown in table 26,[1/] are summarized in table 2.

As shown in the tabulation below, there are seven States that will have to increase capital outlays (measured in current dollars) by more than 350 percent in the period 1969-73, as compared with the level of investment in 1962-66. At the other extreme, there is one State, Wisconsin, whose projected requirements for sanitary sewers and waste treatment facilities are actually below the previous years' outlay.

Number of States*	Indicated percent increase in outlays
1	- 10
7	0 - 50
10	51 - 100
6	100 - 150
6	151 - 200
10	201 - 250
4	251 - 350
7	over 351
51	

* Including the District of Columbia.

[1/] Tables 26 through 29 are in Appendix IV

Table 2. Municipal Waste Treatment Facilities and Sanitary Sewers, Construction Contract Awards, 1962-66, and Required Capital Outlays, 1969-73, by States[a]

(millions of current dollars and percentage change)

State	Contract construction awards 1962-67[b]	Required capital outlays 1969-73	Percent increase 1962-66 to 1969-73
Alabama............	58.6	181.2	209.2
Alaska.............	10.0	20.5	105.0
Arizona............	42.0	209.0	397.6
Arkansas...........	45.0	63.6	41.3
California.........	350.9	2,609.9	643.8
Colorado...........	49.0	134.6	174.7
Connecticut........	99.4	305.5	207.3
Delaware...........	14.4	47.4	229.2
District of Columbia..........	44.8	71.1	58.7
Florida............	146.5	793.1	441.4
Georgia............	66.9	290.2	333.8
Hawaii.............	31.9	128.8	303.8
Idaho..............	8.3	30.0	261.4
Illinois...........	242.7	536.0	120.8
Indiana............	136.3	217.3	59.4
Iowa...............	58.4	63.3	8.4
Kansas.............	56.0	59.6	6.4
Kentucky...........	85.1	156.0	83.3
Louisiana..........	105.1	322.2	206.6
Maine..............	20.0	49.4	147.0
Maryland...........	119.4	232.3	94.6
Massachusetts......	112.5	490.4	335.9
Michigan...........	224.8	716.5	218.7
Minnesota..........	123.0	234.1	90.3
Mississippi........	37.8	91.6	142.3
Missouri...........	146.6	502.4	242.7
Montana............	11.2	29.8	166.1
Nebraska...........	41.6	55.2	32.7
Nevada.............	18.9	30.1	59.3
New Hampshire......	18.4	51.3	178.8
New Jersey.........	183.0	899.5	391.5
New Mexico.........	27.3	60.7	122.3
New York...........	341.9	1,620.8	374.1
North Carolina.....	113.7	161.3	41.9
North Dakota.......	9.0	16.2	80.0

continued

Table 2. Continued -- Municipal Waste Treatment Facilities and Sanitary Sewers, Construction Awards, 1962-66, and Required Capital Outlays, 1969-73 by States

State	Contract construction awards 1962-67	Required capital outlays 1969-73	Percent increase 1962-66 to 1969-73
Ohio	236.4	680.6	187.9
Oklahoma	37.5	90.3	140.8
Oregon	55.3	187.8	239.6
Pennsylvania	292.3	342.3	17.1
Puerto Rico	13.9	n.a.	n.a.
Rhode Island	24.0	72.9	203.8
South Carolina	39.7	119.6	201.3
South Dakota	9.0	15.0	66.6
Tennessee	103.4	200.8	94.2
Texas	195.5	651.9	233.5
Utah	18.5	174.7	844.3
Vermont	17.6	18.9	7.4
Virginia	96.3	288.8	199.9
Washington	152.2	384.7	152.8
West Virginia	41.6	64.7	55.5
Wisconsin	167.2	151.5	-10.4
Wyoming	2.3	13.8	500.0
TOTAL U.S.	4,693.1	14,939.1	218.3

---

a/ See Table 26 (Appendix IV) for breakdown by treatment facility and sanitary sewer, and by year.

b/ Excludes privately financed sanitary sewers.

Source: Contract awards from U.S. Department of Interior, Federal Water Pollution Control Administration, WP-15 Series Publication, Table 4. Required capital outlays from U.S. Department of Interior, FWPCA, unpublished data. Data in constant 1968 dollars have been adjusted to current dollars on the basis of projected construction cost increase.

Capital Requirements by Community Size

Equally striking variations in capital requirements also occur among communities of different sizes. Relevant data (available only for municipal waste treatment facilities) are shown for the Nation in table 3 and for the individual States in table 27. One apparent feature of the data is that the requirements for communities of less than 5,000 are very large. These include communities which are presently totally without waste treatment facilities. They account for over $2 billion of projected requirements, or nearly one-third of the total national waste treatment plant needs.

The other most pressing requirement is to improve presently inadequate facilities for communities of over 100,000 population. This represents a financial requirement of $1.3 billion over the period of the program for waste treatment facilities alone. The entire FWPCA program is designed to meet urban requirements. Many small communities which are part of, or contiguous to, metropolitan areas would therefore be covered by the program. The burdens of the requirements of these small communities will be less than those indicated in table 3 if their needs can be served through metropolitan or regional undertakings.

Table 3. Required Capital Outlays[a] for Municipal Waste Treatment Plants by Function and Size of Community for Total United States, 5-Year Period, 1969-73[b]

(in millions of current dollars)

Function	Size of community						
	Under 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Total United States:							
Upgrading less-than-adequate facilities...	508.0	138.3	493.9	208.5	1,307.8	--	2,656.5
Elimination of current unmet needs...........	1,654.3	211.3	221.5	813.7	253.1	--	3,153.9
Provision for population and industrial increases.............	85.1	84.6	236.1	327.1	193.1	237.2	1,163.2
Total...............	2,247.4	434.2	951.5	1,349.3	1,754.0	237.2	6,973.6

---

[a] Excluding depreciation allowances.

[b] For breakdown by States, in constant 1968 dollars, see Table 26.

Source: Compiled from U.S. Department of Interior, Federal Water Pollution Control Administration, unpublished data, adjusted to current dollars.

Construction Cost Increases

The basic projections of needs prepared by the FWPCA are expressed in terms of 1968 dollars. Conversion of these into current costs raises the level of requirements from $13.6 to $15.0 billion.

Cost changes in sewerage construction are, of course, governed by fluctuations in the general level of prices, but they could also reflect the special factors that may be created by the size of the program itself. In this latter regard, there are several key industries and professions involved, including the manufacturers of relevant equipment (pipes and piping, pumps, process equipment, etc.), the construction industry, and the consulting engineers who design the requisite facilities. In each instance, there are two fundamental questions which must be posed before the program can be objectively appraised from a cost point of view. First, are these affected industries and professions physically capable of undertaking the design and construction of sewerage works at an annual rate nearly three times that which prevailed during the past few years; and second, if the absolute capacity does in fact exist or can be created, is the magnitude of the program in and of itself likely to drive up factor prices.

In an effort to answer these questions, the authors of this report personally contacted a number of authorities in these industries and professions.[1/] There was virtual unanimity in the view that all elements could respond to the demand placed upon them by the program without being forced into significantly higher cost positions. In the field of general contracting, it was pointed out that sewerage construction is not so specialized as to severely impede the mobility of general contractors, as compared with highway, school, or hospital construction. The present FWPCA program in the waste treatment field is analogous to the Federal highway program in the sense that both programs entail rapid and large increases in outlays. Yet the Federal highway program, immense as it is, has not been accompanied by extraordinary cost increases which can be traced to the program itself.

Similar investigations were made into the major industrial and professional areas which would be affected by

---

[1/] Including representatives of the Water Pollution Control Federation, Associated General Contractors of America, Consulting Engineers Council, and the Water and Waste Water Equipment Manufacturers Association.

the program, and similar conclusions emerged -- the scope of the program is not so large, the field so specialized, nor the present extent of operations of the affected participants so near physical capacity as to create an increase in factor costs.

While the program itself may not cause increased costs, the general level of prices will most certainly rise during the period required to attain the waste water quality standards called for by the Federal legislation. Based on trends since 1950, construction costs for sanitary sewers have been projected to increase by an average 3.0 percent per year for the period 1968-72, while the costs of treatment plants are projected to rise on the average by 3.3 percent per year1/ (table 4). A prediction of future construction costs increases is beyond the scope of this study, and the projections used here are not intended to represent a definitive judgment on this question. It should be noted, however, that both sanitary sewer and treatment facility costs have increased with unmistakable regularity in the 17-year period ending in 1966.

1/ Methodology is discussed in Technical Note 2, Appendix I.

Table 4. United States Sewerage Construction Cost Indexes, August Values 1950-67, and Projections, 1968-72

Year	Sanitary sewers	Municipal waste treatment facilities
	Index: 1957-59 = 100	
Actual:		
1950	68.5	69.3
1951	74.0	73.9
1952	76.3	76.8
1953	80.6	80.8
1954	83.1	82.8
1955	86.7	87.2
1956	92.5	91.9
1957	96.8	98.0
1958	100.4	101.5
1959	104.8	103.7
1960	106.2	105.0
1961	108.2	105.8
1962	109.7	107.0
1963	113.1	108.5
1964	115.1	110.5
1965	117.3	112.6
1966	121.2	116.9
1967	125.4	120.3
Projected:		
1968	129.0	124.0
1969	132.9	127.6
1970	136.8	131.8
1971	140.9	136.5
1972	145.6	141.5
	Average annual percent change (compounded)	
Actual:		
1950-67	+3.6	+3.3
1957-67	+2.6	+2.1
1965-67	+3.4	+3.4
Projected:		
1968-72	+3.0	+3.3

continued

Table 4. Continued -- United States Sewerage Construction Cost Indexes, August Values 1950-67, and Projections, 1968-72

Source: 1950-67 from Public Health Service, Division of Water Supply and Pollution Control, Sewer Construction Cost Index, PHS Publ. No. 1132, 1964, Appendix E, p. 27, and Sewage Treatment Plant Construction Cost Index, PHS Publ. No. 1069, 1963, Appendix G, p. 31; and U.S. Department of Interior Federal Water Pollution Control Administration, "Sewerage Treatment Plan and Sewer Construction Cost Index," mimeographed monthly report. Projected Indexes 1968-72, see text.

The Effects of Delays on Costs

The issue of increasing construction costs plays a crucial role in evaluating the effects of a delay in the timing of the program. Continuing escalation of construction costs will increase total project costs under any assumed delay. Modest capital outlays during the early years of the presently assumed timespan, accompanied by comensurately larger expenditures in subsequent years so as to obtain the quality standards by 1973, will result in higher total costs. A rephasing of the program over ten years instead of five would result in higher costs for both sewers and waste treatment facilities of well over $1 billion. This is attributable solely to the continued increase in construction costs at the projected rates. If the entire program is implemented during the coming five years, cost increases are expected to result in total capital outlays which are $1.3 billion higher than the same real figure expressed in constant 1968 dollars. This represents a rise of 9.7 percent, attributable to construction cost increases. Prolongation of the same program over an additional five years, accompanied by rising costs at the same projected rates, would place the total cost at approximately $16.2 billion instead of the presently indicated figure of $14.9 billion, an increase of $1.3 billion or 8.5 percent. This is nearly 20 percent greater than the same cost on a constant 1968 dollar basis.

In this evaluation of the effect of delay on costs, we have not attempted to project changes in interest charges. Such changes cannot be foreseen or projected in the same manner as construction costs, because they are dependent on political, military, and international conditions which are highly uncertain.

Perspective on Requirements

The cost of the water pollution control program is great, but not unprecedented in total size or even in terms of the respective shares of Federal, State and local government requirements. The Federal government and the State and local governments have, in the recent past, increased capital outlays in a brief timespan by sums larger than those indicated by present water quality programs. For example, State and local capital outlays for highways amounted to over $20 billion during the five-year period 1953-57. They increased by nearly $15 billion during the period 1960-64. During that time the Federal contribution to the highway program increased to a total of nearly $15 billion, more than three times the previous contribution. Of course these highway programs far exceed those which are called for to provide clean water, and their financing has been greatly facilitated by the creation of a special fund using gasoline tax revenues. The Federal government contribution to the highway program during the period 1960-64 was more than four times as large as the existing authorization for Federal construction grants for water pollution control. For the State and local governments, the increase in their outlays for highway construction during those five-year periods was 50 percent greater than the sum which they would be required to invest for clean water, even assuming no Federal contribution whatever.

Similarly, capital outlays by State and local governments for education increased by well over $6 billion between 1953-57 and 1960-64. This exceeds the sums required from such governmental units for sanitary sewers and waste treatment plants under the present program, provided Federal authorization for grant funds is fully appropriated.

It is noteworthy that certain capital programs with which the water pollution program competes are likely to taper off in the 1970's. For example, estimates prepared for the Joint Economic Committee show total capital outlays by State and local governments amounting to $13.6 billion in 1970 and $40.7 billion in 1975, compared with $20.1 billion for 1965[1] (table 5). But the share of such outlays allocated for transportation and education is estimated to decline from 68.7 percent in 1965 to 62.6 percent in 1975.[2] Funds "liberated" for other activities are estimated at $2.3 billion in 1970 and $2.5 billion in 1975. Some of these funds may be available for water pollution control.

Federal and State Assistance: Components and Amount

Under the provisions of the Clean Water Restoration Act, varying levels of Federal grant funds may be available to assist in financing the cost of municipal waste treatment facilities in urban areas. In the absence of State participation, the maximum level of Federal aid is 30 percent of

---

[1] U.S. Congress, Joint Economic Committee, State and Local Public Facility Needs and Financing, 1966. Vol. 1, p. 14.

[2] The JEC statement of needs in education, referring to Bureau of Census projections, reckons that the school-age population (between 5 and 21 years of age), will increase at an annual rate of 1.1 percent per year in the period 1966-75 against 3.2 percent in the prior decade. (JEC, State and Local Public Facility Needs, Vol. 1, p. 45.) Also, the major part of the Interstate Highway System will also have been completed by the early 1970's.

Table 5. Comparison of State and Local Capital Outlays for Public Facilities in 1965 with Estimated Capital Requirements in 1970 and 1975

(Values in billions of dollars)

Facility	1965		1970		1975	
	Value	Percent	Value	Percent	Value	Percent
Water and sewer..	2.7	13.4	5.5	17.4	6.8	16.7
Electric and gas.	.8	4.0	1.3	4.1	1.4	3.4
Transportation...	8.9	44.3	13.5	42.7	17.7	43.5
Education........	4.9	24.4	5.9	18.7	7.8	19.1
Health...........	.8	4.0	1.3	4.1	1.7	4.2
Recreation and cultural........	1.5	7.5	3.4	10.8	4.4	10.8
Other public buildings.......	.5	2.5	.7	2.2	.9	2.2
Total..........	20.1	100.0	31.6	100.0	40.7	100.0

Source: U.S. Congress, Joint Economic Committee, State and Local Public Facility Needs and Financing, Vol. 1, 1966, pp. 13,14.

construction costs. If a State agrees to match this 30 percent contribution, Federal aid can increase to 40 percent, which relieves the local government of 70 percent of the burden of financing the requisite facilities. Metropolitan areas are eligible for Federal aid of 55 percent, with the State contribution 25 percent, leaving only the residual 20 percent to be borne by the recipient local government. To date, 20 States1/ have adopted legislation providing a minimum of 25 percent matching grants, of which 132/ have authorized grants of up to 30 percent. Only 9 States3/ have appropriated such funds.

The effects of such maximum Federal participation on overall requirements for both sewers and waste treatment facilities are the following (in billions of dollars):

1/ California, Colorado, Connecticut, Georgia, Indiana, Maine, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont and Wisconsin.

2/ Connecticut, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Texas, Vermont, and Wisconsin.

3/ Indiana, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Oregon, Rhode Island, and Vermont.

	Outlays 1962-66	Requirements 1969-1973
Total..............	4.7	14.9
Financed by Federal grants for water treatment...........	0.4	4.5
Remainder for State and local governments................	4.3	10.4

An increase in expenditures of this magnitude does not seem unmanageable in view of the probable shifting in the composition of government outlays described in the previous section. If we assume that the Federal contribution will be less than 55 percent (because only $3.5 billion has been authorized thus far), State and local outlays would have to rise to $11.4 billion. This represents an average annual amount of $2.3 billion and accounts for between 33 and 42 percent of the total figure which the JEC estimates may be available for sewers and water capital outlays between 1970 and 1975 (see table 5).

For waste treatment facilities alone, the prospect for achieving scheduled goals seems brighter than for the program as a whole. The Federal contribution of 55 percent is specifically confined to such facilities; if the full

55 percent were forthcoming, State and local outlays for waste treatment would have to rise to only $3.7 billion, compared with $2.8 billion in 1962-66. If only $3.5 billion were appropriated, the affected communities would have to finance the shortfall, raising their outlays from $2.8 to $4.7 billion. The absence of funding to meet substantially all the needs for sewers could, of course, inhibit the program for waste treatment. Needless to say, both sewer and treatment programs would face enlarged problems if appropriations were substantially less than the authorized $3.5 billion.

Table 6 portrays the requirements for State and local financing for municipal waste treatment facilities under varying assumptions of Federal grants: 55 percent of waste treatment costs; up to present authorizations of $3.5 billion; 30 percent of waste treatment costs; and 50 percent of present authorizations. It is this last figure which should command particular attention. If Federal grants fall well below authorizations, which seems likely, the State and local governments will have to carry heavy additional burdens. Specifically, if the Federal government provided only 50 percent of the present authorization, rather than 55 percent, the added burden for the affected

Table 6. Projected Municipal Waste Treatment Facilities Costs, Assuming No State Grants and Varying Levels of Federal Grants, 1969-73

(in millions of current dollars)

Year	Required capital outlays	Federal contributions				Net cost to State and local gov'ts. assuming Federal contributions			
		30 percent of costs	55 percent of costs	Presently authorized[a]	50 percent of presently auth.	30 percent of costs	55 percent of costs	Presently authorized[a]	50 percent of presently auth.
1969..	1,480.8	444.2	814.4	150.0	153[b]	1,036.6	666.4	1,330.8	1,327.8[c]
1970..	1,553.6	466.1	854.5	450.0	203[b]	1,087.5	699.1	1,103.6	1,350.6[c]
1971..	1,633.6	490.1	898.5	700.0	350.0	1,143.5	735.1	933.6	1,283.6
1972..	1,721.5	516.5	946.8	1,000.0	500.0	1,205.0	774.7	721.5	1,221.5
1973..	1,816.0	544.8	998.8	1,250.0	625.0	1,271.2	817.2	566.0	1,191.0
Total.	8,205.5	2,461.7	4,513.0	3,550.0	1,831.0	5,743.8	3,692.5	4,655.5	6,374.5
Annual avg.	1,641.1	492.3	902.6	710.0	366.2	1,148.8	738.5	931.1	1,274.9

---

a/ Assumes Federal grants authorized during the five years to which the present legislation refers will be made available during the five years of the program, 1969-73.

b/ Actual appropriations.

c/ Based on actual appropriations.

communities would be $2.7 billion in the years 1969-73. The States and local communities would then have to finance $13.1 billion in 1969-73, against actual outlays of $5.3 billion in 1962-66. The costs to the communities for both sanitary sewers and municipal waste treatment facilities in 1969-73, assuming 55 percent Federal contribution for treatment plant construction outlays, are shown in table 28. The reader can make appropriate adjustments to these figures according to his assumption of the likely level of Federal financing. In California, for example, where total capital requirements amount to $2.6 billion (see table 26), the maximum Federal contribution of 55 percent of municipal waste treatment plant costs ($724 million) will oblige the State and the local governments to contribute the remaining $1,886 million (table 28); if the Federal contribution were reduced to 30 percent, the residual requirement would rise to $2,215 million over the five years.

Thus far, we have emphasized the Federal contribution. The fact is that the burden on local governments of meeting the program's requirements would be very significantly eased by State government financial participation. This is shown on a national basis in table 7; a companion series in

Table 7. Municipal Waste Treatment Facilities, Required Capital Outlays, Assuming Varying Levels of State and Federal Grants, 1969-73

(in millions of current dollars)

Item	1969	1970	1971	1972	1973	Total
Required capital outlays.......	1,480.8	1,553.6	1,633.6	1,721.5	1,816.0	8,205.5
Assuming 30 percent Federal grants:						
Cost to local government....	1,036.6	1,087.5	1,143.5	1,205.0	1,271.2	5,743.8
Assuming 40 percent Federal, 30 percent State grants:						
Cost to local governments...	444.2	466.1	490.1	576.5	544.8	2,461.7
Cost to State governments...	444.2	466.1	490.1	576.5	544.8	2,461.7
Assuming 50 percent Federal, 25 percent State grants:						
Cost to local governments...	370.2	388.4	408.4	430.4	454.0	2,051.4
Cost to State governments...	370.2	388.4	408.4	430.4	454.0	2,051.4
Assuming 55 percent Federal, 25 percent State grants:						
Cost to local governments...	296.2	310.7	326.7	344.3	363.2	1,641.1
Cost to State Governments...	370.2	388.4	408.4	430.4	454.0	2,051.4

Source: Required capital outlays from U.S. Department of Interior, Federal Water Pollution Control Administration, unpublished data in constant dollars, adjusted to current dollars on the basis of projected construction cost increases.

table 29 presents similar data for the individual States. These tables illustrate the effect of this added assistance to the local governments. If the Federal government provides 55 percent financing because the States have provided their 25 percent matching funds, the local requirement for financing of waste treatment plants would amount to only $1.64 billion over the five years of the program, $1.2 billion less than the amount which was actually paid out for capital undertakings in the past five years.

There is, of course, great latitude for questioning the extent to which the Federal government will contribute funds up to the amount provided by the legislation. Serious questions also arise in regard to the ability of the State governments to make available $2 billion matching funds for the construction of municipal waste treatment facilities. If these governmental units fall short in their financial contributions, the added burden will fall on the local governments. The extent of the burdens on State and local governments for capital needs overall, for clean water programs in particular, and the possibility of their satisfying them are the subjects of Chapter II.

II. THE ABILITY OF STATE AND LOCAL GOVERNMENTS TO FINANCE REQUIRED CAPITAL OUTLAYS

In the preceding chapter the magnitude of the required capital outlays to meet the water quality standards by 1973 was discussed. These capital expenditures were shown under various assumptions as to the level of Federal grants. To appreciate the relative importance of these outlays, overall capital requirements of State and local governments were also discussed.

The purpose of this chapter is to examine the sources of financing for both aggregate capital outlays and sewer and waste treatment facilities. The availability of these sources--current revenues, Federal grants, user charges and borrowings--and the effect they have on each other are examined. Attention is given to the supply of and demand for municipal bonds, to the historical patterns of the municipal securities market and to the methods of public borrowings. The chapter concludes with an analysis of the capacity of the municipal securities market to absorb the required borrowings. This will permit a forecast as to the continued ability of State and local governments to finance the required capital outlays from borrowings for sewer and waste treatment facilities to attain the water quality standards of the Federal Water Pollution Control Program.

Sources of Financing Capital Outlays

Before discussing the ability of State and local governments to finance the necessary capital expenditures for sewer and waste treatment facilities, it is useful to review the pattern of total capital outlays and the methods by which the sources of financing were provided. It is also helpful to project future capital outlays and gauge their effect upon the available sources of financing.

In the 1956-66 decade, State and local capital outlays doubled, growing from $11.4 billion to $22.3 billion (Table 8). Anticipated outlays of State and local governments for capital purposes are estimated to be $31.6 billion for 1970 and $40.7 billion for 1975--the latter figure being virtually twice as large as it is today.[1] Historically one-half of these outlays have been financed through borrowings, a trend which the study prepared for the Joint Economic Committee assumes will continue.[2] This would indicate borrowings for capital outlays of $15.8 billion in 1970 and $20.4 billion in 1975.

---

[1] JEC Report, Vol. 2, Table B4, p. 35.

[2] JEC Report, Vol. 2, p. 32.

Table 8. Total Federal Grants to State and Local Governments Including Grants Specifically for Capital Outlays, 1956-66 and Projections of Total Federal Grants Including Grants Specifically for Capital Outlays, 1970 and 1975

(in million dollars)

Fiscal Year	Total State & local capital outlays	Sources of funds for capital outlays			Total Federal grants
		State & local borrowing	State & local general revenues	Federal grants specifically for capital outlays	
	(1)	(2)	(3)	(4)	(5)
1956..	11,407	6,307	4,157	943	3,724
1957..	12,616	6,779	4,665	1,172	4,039
1958..	13,986	7,825	4,384	1,777	4,935
1959..	15,351	7,542	4,840	2,969	6,669
1960..	15,104	7,286	4,465	3,353	7,040
1961..	16,091	7,479	5,519	3,093	7,112
1962..	16,791	8,351	5,183	3,257	7,893
1963..	17,946	9,391	5,022	3,533	8,634
1964..	19,087	10,982	3,652	4,453	10,141
1965..	20,771	9,258	6,478	5,035	10,904
1966..	22,330	--	--	--	12,960
1967*					15,366
1968*					17,439
1970..	31,600	15,800	4,836	10,964	21,928
1975..	40,700	20,350	4,836	15,514	31,028

*Estimated

Sources:

Col. (1) 1956-65: JEC, State and Local Public Facility Financing, Vol. 2, p. 33.
1966: U.S. Department of Commerce, Governmental Finances, 1965-66, GF-13, p. 21.
1970 and 1975: JEC, State and Local Public Facility Needs, Vol. 1, p. 14.

Table 8. Continued -- Total Federal Grants to State and Local Governments Including Grants Specifically for Capital Outlays, 1956-66, and Projections of Total Federal Grants Including Grants Specifically for Capital Outlays, 1970 and 1975

(2) 1956 and 1957: JEC, Vol. 2, p. 34.
1958-65: JEC, Vol. 2, p. 59.
1970 and 1975: 50 percent of Column (1) in accordance with procedure contained in JEC, Vol. 2, p. 35, Columns 1 and 4. Actual JEC figures of $16.3 billion in 1970 and $21.0 billion in 1975 contain small Housing and Urban Renewal component.

(3) 1956-65: Columns (1) minus (2) minus (4).
1970 and 1975: Average 1956-65. The chief obstacle to substantial increases in State-local contributions to capital outlays out of general revenues is the simultaneously rising demands for funds for current operations. The JEC report comments on the fact that State and local governments must resort to their general revenues for partial funding of their capital outlays as follows: "There is no basis for estimating in detail the origin of the 'other financing sources'. ...It is reasonable to presume that a considerable portion came from tax collections, in view of the important place of taxes in the revenue structure of State and local governments. However, nontax revenue sources are relatively more significant than seems to be recognized, and these have also, directly or indirectly, financed an indeterminate portion of State-local capital spending." JEC, Vol. 2, p. 63.

(4) 1956-65: JEC, Vol. 2, p. 61.
1970 and 1975: Columns (1) minus (2) minus (3).

(5) 1956-68: JEC, Revenue Sharing and Its Alternatives, Vol. 1, p. 159.
1970 and 1975: Column (4) x 2. In 1965, Federal grants specifically for capital outlays represented 46.2 percent of total Federal grants. It is assumed that Federal grants specifically for capital outlays will rise to 50 percent of total Federal grants in 1970 and 1975.

Note

The above projections of total Federal grants in 1970 and 1975 are in the same order of magnitude with those from other sources cited below.

Table 8. Continued -- Total Federal Grants to State and Local Governments Including Grants Specifically for Capital Outlays, 1956-66 and Projections of Total Federal Grants Including Grants Specifically for Capital Outlays, 1970 and 1975

	Projected Total Federal Grants (in dollars billion)	
	1970	1975
National Planning Association	19.5	31.0
G. Washington Univ. Project '70, I (High Revenue Proj.)	21.8	--
G. Washington Univ. Project '70, II (Low Revenue Proj.)	18.1	--
Tax Foundation	20.3	30.0

Sources:

For JEC figures, see U.S. Economic Growth to 1975: Potentials and Problems, 1966, p. 26 (reprint). For other projections, see JEC, Revenue Sharing and Its Alternatives, Vol. III, Federal, State, Local Fiscal Projections, July 1967, p. 1244 and 1248.

The balance of State and local outlays for capital purposes, $15.8 billion in 1970 and $20.3 billion in 1975, would have to be met from two sources: general revenue and Federal grants. The JEC report observes that expenditures for current needs will continue to rise as rapidly as current revenues, so that revenues cannot be expected to finance capital outlays to any greater degree than has been the case in recent years. General revenues available for capital outlays have averaged $4.8 billion annually from 1956 to 1965 (Table 8). The $4.8 billion figure is therefore assumed in this analysis to be the annual amount of funds available from general revenues through 1975 to finance capital outlays.

With borrowing and general revenue capabilities accounted for, the balance of the required capital requirements ($11.0 billion in 1970 and $15.5 billion in 1975) would have to be raised through Federal grants. In 1956, Federal grants for capital outlays came to $943 million, or 8.3 per cent of State and local capital outlays. However, Federal grants for State and local capital outlays have been steadily rising as a percentage of total Federal grants for both capital and current needs--from 25.3 per cent in 1956 to 46.2 per cent in 1965. It is reasonable to project that Federal grants specifically for capital outlays will rise by 1970 to 50 per cent of total Federal grants (Table 8).

There is, nevertheless, a divergence of opinion as to the future level of Federal grants. A JEC study prepared in 1966 estimates total Federal grants as low as $17.5 billion in 1970 and $25.0 billion in 1975.[1/] A later study prepared by the Bureau of the Budget includes an estimate of $17.4 billion for FY 1968.[2/] Thus the 1970 figure appears conservative. Others estimate the range of Federal Grants in 1970 from a low of $18.1 billion to a high of $21.8 billion and in 1975 from $30.0 billion to $31 billion (See footnote to Table 8). The ultimate level will determine the extent of the need for additional State and local borrowings.

As set out in Table 8, total Federal grants are projected to a level of $21.9 billion in 1970 and $31.0 billion in 1975, upon the assumption that one-half of State and local capital outlays will come from borrowings and that general revenues will provide approximately $4.8 billion for capital outlays as in the past. It is further assumed that of these total Federal grants, 50 per cent, or $11.0 billion in 1970 and $15.5 billion in 1975, will be made available specifically for capital outlays. Should Federal grants not exceed the low estimates made in the JEC Report on Economic Growth, borrowings would have to rise to $18.0 billion in 1970 and $23.5 billion in

---

[1/] JEC, U.S. Economic Growth to 1975: Potentials and Problems, Dec. 1966, p. 26 (reprint).

[2/] JEC, Revenue Sharing and Its Alternatives: What Future for Fiscal Federalism? July 1967. Vol. I, pp. 156-170.

1975, which in either case represents 57.9 per cent of capital outlays.[1] In the past twenty-year period, the ratio of borrowings to capital outlays has been approximately 50 per cent. However, borrowings as a percentage of capital outlays did reach 57.5 per cent in the 1963-64 period and averaged 56.2 per cent in the years 1952-57.[2]

A greater reliance upon user charges, especially for commercial and industrial enterprises, would in many instances reduce the pressure for Federal grants as well as ease the strain on general revenue and property taxes to support borrowings. An example of what one municipality, Omaha, Nebraska, has done to provide sewer and waste treatment facilities for its packinghouse industry with user charges and revenues from recovered wastes as the principal sources of financing, is discussed in General Note 1, Appendix II.

Further study concerning the potential for employing user charges in the next decade is needed. Currently the unfamiliarity of municipalities and industry with such techniques means that the user charge financing can be expected in the near future. Such a study would be highly useful.

---

[1] If total Federal grants are $17.5 billion in 1970, the portion for capital outlays would be $8.8 billion. If total Federal grants are $22.0 billion (Table 8), the portion for capital outlays would be $11.0 billion. Adding the difference of $2.2 billion to borrowings of $15.8 billion in 1970 yields $18.0 billions.

[2] JEC Report, Vol. 2, Table 8, p. 62.

Sewer and waste treatment programs historically have been only a small part of total State and local capital expenditures. In the years 1955-65 they amounted to 5.1 per cent of such outlays--with Federal grants being virtually insignificant. [1] Absent Federal grants for the program, State and local governments will have to spend 9.0 per cent of their capital budgets in 1969-73 to meet the Federal water quality standards. Federal grants of $3.5 billion would lower the percentage to 6.9 per cent.

It is essential to note a difference between the JEC estimate of outlays for water pollution control in the 1970's and the FWPCA estimate of required outlays. The latter exceeds the former by about $1.0 billion annually in the early 70's and implies, of course, a greater financing burden for the State and local governments. [2] The foregoing measurements of 9.0 per cent and 6.9 per cent are derived from JEC estimates of total capital outlays unadjusted for the difference of $1.0 billion annually.

---

[1] JEC Report, Vol. 2, Table B, p. 67

[2] The JEC estimates outlays at $1.6 billion in 1970 and $2.3 billion in 1975, an average of about $2.0 billion. FWPCA estimates needs in the 1969-73 period at $3.0 billion annually.

Supply of and Demand for Municipal Obligations

In examining the ability of the affected units of governments generally to finance capital outlays, and more particularly to attain the water quality standards established by the Federal program, it is necessary to consider the projected supply of borrowings and the availability of investable funds from institutional sources to meet these demands.

The estimates prepared for the Joint Economic Committee of required net additions to the volume of municipal obligations and the supply of net new investable funds for the period 1966-75 appear in Table 9. The figures in Series B are slightly lower than the figures in Series A as a result of more conservative estimates of municipal bond holdings by banks and personal trust funds. The first column shows the net borrowings required by State and local governments after allowances for general revenues, Federal grants and estimated retirements. A comparison of the respective figures indicates that funds available for investment in municipal bonds will be more than sufficient to meet the required borrowings by State and local governments after 1968.

As shown in Table 10, the increase of State and local indebtedness over the current level is estimated to be $111 billion by 1975. Obligations representing $68.8 billion of

Table 9. State and Local Government Obligations: Projected Net Borrowings, 1966-75, and Funds Available

(Billions of dollars)

Year	Net required borrowings	Funds available	
		Series A	Series B
1966.....	8.5	8.0	7.2
1967.....	8.7	8.8	8.0
1968.....	9.0	9.3	8.6
1969.....	9.3	10.2	9.3
1970.....	9.7	10.8	9.9
1971.....	10.0	11.2	10.3
1972.....	10.3	12.1	11.1
1973.....	10.9	12.6	11.5
1974.....	11.1	13.7	12.6
1975.....	11.3	14.3	13.0

Source: JEC, State and Local Public Facility Financing, Vol. 2, p. 21.

Table 10. Holdings of State and Local Government Obligations by Investor Groups, 1946-75

(Billions of dollars)

Investor group	Year-end billings				Change 1965-75
	1946	1955	1965	1975	
Commercial Banks............	4.4	12.7	38.7	107.5	68.8
Mutual Savings Banks........	.1	.6	.3	.4	0.1
Life Insurance Companies....	.6	2.0	3.5	3.8	0.3
Fire and Casualty Insurance Companies...............	.2	4.2	11.4	21.4	10.0
State and Local Retirement Funds...................	.8	2.7	2.6	.5	-2.1
State and Local Governments.	1.6	2.5	2.1	1.1	-1.0
Municipal Bond Investment Funds...................	a/	a/	.2	2.6	19.0
Personal Trust Funds........	3.0	6.7	13.2	33.0	19.8
Other Financial Institutions	.8	.9	1.6	2.2	0.6
Other Corporations..........	.3	1.2	3.6	6.0	2.4
Federal Credit Agencies.....	.4	.7	2.8	5.4	2.6
Individuals and Others......	3.4	10.6	20.0	27.1	7.1
Total[b/]..................	15.6	44.8	100.0	211.0	111.0

---

a/ Nonexistent, 1946-60.
b/ Totals may not equal sum of figures due to rounding.

Source: JEC Report, Vol. 2, pp. 17-18.

the increased indebtedness--62 per cent of the expansion--will be accounted for by commercial banks; $19.8 billion--18 per cent--will be absorbed by personal trust funds; $10 billion--10 per cent--by fire and casualty companies; and $7.1 billion--6 per cent--by "individuals and others". In other words, of the projected increase in municipal obligations, these four investor groups will account for 96 per cent.[1]

Patterns of the Municipal Securities Market

Up to this point we have discussed the requirements for public borrowings and the availability of investable funds without looking at the municipal securities market itself. It is relevant to inquire to what extent market patterns will change with the offering of such substantially increased volumes of sewer bonds, leaving for the last section the questions whether the effect of such changes may operate as a constraint on State and local governments.

New issues of municipal securities reached an all-time high in 1967 of $14.2 billion.[2] The volume of new issues for that year was 28.4 per cent more than the previous high in 1966 of $11.1 billion.[1] Annual increases in the volume of municipal bond sales have shown a strong upward trend. Over the 20-year period from 1947 to 1967, municipal bond sales jumped from $2.4 billion to $14.2 billion. The JEC study indicates that State and local government borrowings will continue at an accelerated rate. By its projectsions, the amount of municipal obligations outstanding, now more than $100 billion, will double by 1975.[2]

---

[1] For a detailed analysis of municipal bond holdings by significant investor groups and their projections, see General Note 2, Appendix II.

[2] The Daily Bond Buyer, January 2, 1968.

The findings of the JEC study with regard to the sale of municipal bonds generally are noteworthy. An analysis of the municipal bonds sold during 1957-66 discloses that: (1) competitive bidding (as contrasted to negotiated sales) represented an increasing proportion of general obligations and revenue bond issues; (2) general obligation bonds are used for most of the shorter maturities with revenue bonds favored for the longest maturities; (3) there has been no significant change in the distribution of purposes for which bonds have been issued; (4) while school district borrowings have been stable, borrowings by special districts and statutory authorities have greatly risen; and (5) among the major regions of the country, the South has increased most rapidly in terms of other volume of bonds.[1]

---

[1] This is an abnormally high rate of increase for one year--the full significance of which cannot be determined. Does it mean, for example, that borrowings are covering a greater share of financing now than in the past, or that the public facility programs are growing at a more rapid rate than projected?

[2] Table 10.

A more particularized analysis of public borrowings for sewer and waste treatment facilities is set out in General Note 3, Appendix II. It is logical to project certain trends in the sale of sewer bonds which emerged from the five-year period of 1962-66 over the next five-year period: (1) general obligation bonds will continue to be the principal method by which such facilities are financed, although with the interest rates between revenue and general obligation bonds narrowing, revenue bonds can be expected to increase in relative importance; (2) municipalities will continue to be the major issuers, while special districts will remain a large issuer and authority financing will assume a larger role;[2] (3) issues in the $2-5 million range will continue to predominate; and (4) communities under 25,000 population will continue to execute the largest volume of bond sales.

At the same time it can be anticipated that the percentage of the municipal bond market previously representing sewer and waste treatment bonds will have to change. Municipal obligations provide by far the largest source of financing for sewer and waste treatment facilities.[1] Therefore, anticipated capital outlays provide a guide for the likely need for new issuances of municipal bonds to finance the water pollution control program. Public borrowings for such purposes were $818 million in 1966 (Table 11), with the high for such borrowings, $939 million, occurring in 1963. To comply with the Water Quality Act of 1965, annual borrowings required by State and local governments, exclusive of Federal grants, must average $2.98 billion.[2] This represents a requirement that is more than 3.6 times the present market level for such bonds[3] and would represent 26.9% of the 1966 bond market for all purposes.

---

[1] JEC Report, Vol. 2, p. 8.

[2] General Note 4, Appendix II.

In estimating required borrowings in the municipal bond market for waste treatment and sewer facilities, no adjustment has been made for reductions in borrowings that may

---

[1] Table 11 shows that sales of sewer bonds and combination sewer/water bonds have averaged about 90 per cent of contract awards for sewers and waste treatment facilities in the period 1958-1961. There have been few significant variations from one year to another. The series are not strictly comparable and the figure of 90 per cent must, therefore, be treated with caution.

[2] It is estimated that of the $2.98 billion needed for waste treatment and sewer facilities, approximately $100 million represents the demand for private sewer construction. Since this outlay is a small proportion of the total, no adjustment on the total amount of demand was made for the purpose of this study.

[3] This utilizes for comparative purposes the 1966 municipal bond market volume of $11.1 billion, of which $818 million is estimated for sewer and waste treatment facilities.

Table 11. Sewer Bond Sales and Contract Awards, 1958-67

(in millions of dollars)

Year	Sewer Bond Sales				Construction Contract Awards for Sanitary Sewers and Municipal Waste Treatment facilities
	Sewer[a/]	Sewer water Combination[b/]	Total sewer[c/]	Adjusted total sewers[d/]	
	(1)	(2)	(3)	(4)	(5)
1958	526	114	606	620	699
1959	433	110	510	627	685
1960	389	115	469	635	718
1961	570	111	648	767	827
1962	594	107	669	797	862
1963	524	181	651	939	1,083
1964	551	165	667	828	909
1965	560	200	700	819	879
1966	515	184	644	818	956*
1966[e/]	413				
1967[e/]	398				

[a/] As reported to the Investment Bankers Association, including waste treatment facilities.

[b/] Combination sales, as reported by the Investment Bankers Association, include water and sewer bond sales.

[c/] Assumes 70 percent of Column 2 represents waste treatment and sewer bond sales. Total sewer equals Column 1 plus 70 percent of Column 2.

[d/] Differential (2/3) between reported sewer bond sales (Column 3) and contract awards.

[e/] Nine months.

* Preliminary

Sources: Columns (1), (2), and (3) from Federal Water Pollution Control Administration, Water and Sewer Bond Sales in the United States, January-December, 1958-65, WP-16, formerly PHS publ. #965; Column (5) from FWPCA, WP-15 series publications.

occur as a result of State grants through appropriations. However, were each State to provide 25% matching grants for waste treatment facilities through appropriations, borrowings would be reduced by $410.3 million annually (Table 12).

Table 13 discusses the average annual volume of municipal bonds that will be underwritten and purchased by the investment community under varying levels of Federal financial assistance. The table also relates projected volume of municipal borrowings under varying levels of Federal grants to estimated 1966 bond sales for waste treatment and sewer facilities.[1] and the percentage it would represent to borrowings for all purposes. Thirdly, from the JEC projections of average borrowings for the years 1969-73,[2] $18.6 billion, the table shows what the percentage borrowings for waste treatment and sewer facilities would be in relation to the total municipal bond market.

The importance of Federal grants becomes apparent in analyzing the impact of their curtailment. Without such grants, required borrowings for sewer and waste treatment facilities during the period 1969-73 will have to average 3.6 times the 1966 level. It would represent 16.1% of the estimated average bond market for the years 1969-73.

---

[1] Table 11.

[2] JEC Report, Vol. 1, p. 35.

Table 12. Relation between State Government General Revenues, 1966, and Required Capital Outlays for Municipal Waste Treatment Facilities

(in million current dollars)

State	Average annual required capital outlays 1969-73	State government general revenues, 1966	Increase in 1966 State revenues necessary to provide 25 percent grants for municipal facilities	
			Million dollars	Percent
Alabama..................	22.3	539	5.6	1.0
Alaska...................	2.3	87	0.6	0.7
Arizona..................	12.7	330	3.2	1.0
Arkansas.................	7.3	298	1.8	0.6
California...............	263.1	3,917	65.7	1.7
Colorado.................	15.4	403	3.8	0.9
Connecticut..............	33.5	523	8.4	1.6
Delaware.................	5.3	162	1.3	0.8
District of Columbia	2.5	--	0.6	--
Florida..................	79.1	926	19.8	2.1
Georgia..................	35.6	689	8.9	1.3
Hawaii...................	9.5	232	2.4	1.0
Idaho....................	4.1	139	1.0	0.7
Illinois.................	61.6	1,547	15.4	1.0
Indiana..................	28.9	904	7.2	0.8
Iowa.....................	10.0	500	2.5	0.5
Kansas...................	7.5	413	1.9	0.5
Kentucky.................	20.6	506	5.2	1.0
Louisiana................	33.0	881	8.2	0.9
Maine....................	9.0	157	2.3	1.5
Maryland.................	21.1	680	5.3	0.8

Continued--

Table 12. Relation between State Government General Revenues, 1966, and Required Capital Outlays for Municipal Waste Treatment Facilities (in million current dollars) --Continued

State	Average annual required capital outlays 1969-73	State government general revenues, 1966	Increase in 1966 State revenues necessary to provide 25 percent grants for municipal facilities	
			Million dollars	Percent
Massachusetts............	54.6	884	13.7	1.5
Michigan.................	101.7	1,724	25.4	1.5
Minnesota................	30.5	749	7.6	1.0
Mississippi..............	9.2	342	2.3	0.7
Missouri.................	36.2	650	9.1	1.4
Montana..................	4.7	121	1.2	1.0
Nebraska.................	7.3	169	1.8	1.1
Nevada...................	2.5	96	0.6	0.6
New Hampshire............	6.2	80	1.6	2.0
New Jersey...............	95.1	753	23.8	3.2
New Mexico...............	4.9	280	1.2	0.4
New York.................	183.9	3,839	46.0	1.2
North Carolina...........	15.9	886	4.0	0.5
North Dakota.............	2.2	141	0.6	0.4
Ohio.....................	81.7	1,339	20.4	1.5
Oklahoma.................	8.9	495	2.2	0.4
Oregon...................	22.9	387	5.7	1.5
Pennsylvania.............	58.4	1,870	14.6	0.8
Puerto Rico..............	--	--	--	--
Rhode Island.............	7.5	161	1.9	1.2
South Carolina...........	16.5	416	4.1	1.0
South Dakota.............	2.1	107	0.5	0.5

Continued--

Table 12. Relation between State Government General Revenues, 1966, and Required Capital Outlays for Minicipal Waste Treatment Facilities
(in million current dollars)
--Continued

State	Average annual required capital outlays 1969-73	State government general revenues, 1966	Increase in 1966 State revenues necessary to provide 25 percent grants for municipal facilities	
			Million dollars	Percent
Tennessee................	25.8	533	6.4	1.2
Texas....................	48.9	1,572	12.2	0.8
Utah.....................	23.7	210	5.9	2.8
Vermont..................	3.4	87	0.8	0.9
Virginia.................	33.6	656	8.4	1.3
Washington...............	36.1	809	9.0	1.1
West Virginia............	9.9	306	2.5	0.8
Wisconsin................	20.6	939	5.2	0.6
Wyoming..................	1.8	76	0.5	0.7
Total U. S.	1,641.1	34,511	410.3	1.2

Sources: Average annual required capital outlays calculated from U. S. Department of Interior, Federal Water Pollution Control Administration, unpublished data in constant dollars, adjusted to current dollars on the basis of projected construction cost increases.

1966 State Government General Revenues from U. S. Bureau of the Census, Statistical Abstract of the United States: 1967, Washington, D. C., 1967, Table No. 592, p. 425.

Table 13. Average Annual State and Local Bond Financing Requirements for Sanitary Sewers and Municipal Waste Treatment Facilities,[a] Assuming Varying Levels of Federal Grants for Waste Treatment Facilities

(Values in millions of dollars)

Level of Federal contributions for municipal waste treatment facilities	Residual[b] required borrowings			
	Total Value	Multiple of 1966 level[c]	As percent of 1966 (all-purpose borrowings)[d]	As percent of estimated average total borrowings 1969-73[e]
0 Percent.............	2,987.8	3.65	26.9	16.1
30 Percent.............	2,495.5	3.05	22.5	13.4
55 Percent.............	2,085.2	2.55	18.8	11.2
Presently authorized[f]..	2,278.8	2.79	20.6	12.3
50 Percent of presently authorized.........	2,621.6	3.20	23.6	14.1

---

[a] Assumes average annual bond financing equals average annual required capital outlays; waste treatment facilities, $1.641 million; sewers, $1,346.7 million.

[b] The residual sum includes the level of State and municipal obligation remaining plus the cost of sanitary sewers.

[c] Estimated 1966 level of borrowings for waste treatment and sewer facilities was $818 million (table).

[d] Borrowings of $818 in 1966 for waste treatment and sewer facilities represented 7.4 percent out of total municipal borrowings of $11 billion.

[e] Borrowings will average $18.6 billion for the years 1969-73 (JEC, Vol. 2, p. 35).

[f] Assumes Federal grants authorized during five years to which the present legislation refers will be made available during the five years of the program, 1969-73.

Under the most favorable conditions, a 55% Federal grant, required borrowings by State and local governments would be 2.55 times the 1966 level for such facilities and would represent 18.8% of total borrowings. On the basis of the JEC estimate of the average 1969-73 bond market, borrowings for waste treatment and sewer facilities at this level of Federal grants would represent 11.2% of the total borrowings. It is quite clear neither extreme will apply.

The Congress authorized $3.5 billion in Federal grant assistance. This past year, however, the Congress appropriated only 50% of the authorized Federal grants. This level of appropriations would require borrowings for sewer and waste treatment facilities at 3.2 times current bonding patterns and would represent 14.1% of the projected average municipal bond market over the 1969-73 period.

It is worthwhile to contrast these varying demands on the bond market for sewer and waste treatment facilities with those estimated in the JEC study. The JEC study estimated capital outlays for these facilities, before any Federal grants, at 10.6 per cent of the projected bond market over the 1969-73 period. Under the FWPCA program, using a 55 per cent Federal grant factor, the demand would represent 11.2 per cent of the bond market. If it were assumed that the level of Federal grants would only be 50 per cent of the authorizations, the demand, as indicated earlier, would be 14.1 per cent of the market in this period.

By steadily increasing the rate of interest it is theoretically possible that the increased demands upon the municipal bond market could be absorbed. However, at the higher rates of interest the economic feasibility the desired projects may be jeopardized, statutory rate limitations may be encountered, and a general reluctance by the borrower to pay such rates may be anticipated--any one event may effect a delay in the achievement of the FWPCA program in the scheduled time period. To assure a minimal impact upon required borrowings in the municipal bond market, the level of interest rates and the supply of investable funds, the availability of Federal grants at the maximum authorized level is obviously of great importance.

The Prospects for Required Capital Outlays by State and Local Governments

The question to be answered is whether State and local governments will be able to finance their required capital outlays to comply with the water quality standards and what are the significant factors which could alter or interfere with their ability.

The previous chapter reviewed the estimates for total capital outlays for the years 1970 and 1975--indicated as $31.6 billion and $40.7 billion, respectively. Borrowings were estimated at approximately 50 per cent of total capital outlays, or $15.8 billion in 1970 and $20.4 billion in 1975. Public borrowings must, however, rise to $18.0 billion in 1970 and $23.4 billion by 1975 if total Federal grants are $17.5 billion by 1970 and $25.0 billion by 1975 (and if 50 per cent of these grants is allocated to capital outlays). User charges have been mentioned as an alternate source of financing, lessening the dependence on Federal grants, general revenues and the property tax to support borrowing. We must nevertheless come back to the ability of State and local governments to borrow the remainder of the required funds for public facility capital requirements once allowances are made for Federal grant assistance and State and local general revenues.

As was seen in Table 9, the average annual surplus of investable funds in the period 1968-75 would be $1.57 billion under Series A and $580 million under Series B. It follows that given the JEC estimate of assumed levels of capital demand for municipal securities, State and local governments will be able to continue to provide their required capital outlays through borrowings. However, the JEC report observes that there could prove to be no surplus of investable funds if, as some believe, State and local government capital outlays rise more rapidly than is now foreseen--and the sewer and waste treatment facilities program may be a case in point. And if the Federal government should scale down its grant program with a consequent increase in the demand for public borrowing, there could be a substantial shortage of financial resources available to State and local governments for capital outlays.

A shift in investment attitudes by institutional investors away from municipal bonds could aggravate the shortage. Commercial banks are projected to supply 68 per cent of the expansion funds available for capital outlays. If for any reason commercial banks find alternative investments more attractive (such as business and consumer loans or mortgages), a shortage of credit resources for State and local government debt financing would develop. Any period of credit tightness would also serve to limit the ability of commercial banks to purchase municipal bonds.

Aside from these considerations, it is possible that commerical bank asset expansion may be less than projected. Or it is conceivable that the credit authorities may be reluctant to permit large-scale commercial bank credit expansion, if a sizable portion of the expansion were to be invested in tax-exempt municipal securities.

Similar conjectures could be made regarding future investments by other institutional sources. For instance, a series of catastrophes or disasters (fires, earthquakes, hail, sinkings, civil disorders, wind, automobile accidents and explosions) in any one year could significantly affect the investment programs of insurance companies. The possibility of lower Federal income tax rates may occur, which would cause a wholesale re-examination of the value of tax-exempt income to the respective investor groups. However, with such qualification, it is reasonable to conclude that total capital outlays as estimated by the JEC study are attainable.

Turning to the water pollution control program we should note that the JEC estimate of needs may be too low by about $1.0 billion annually in the 1970's.1/ If this proves to be the case and if the JEC estimates of total State and local capital outlays need to be increased commensurately, the projected surplus of investable funds would turn an overall deficit. In this event, any funds available for water pollution control might shrink along with funds for other capital purposes.

1/ Supra, p. 8.

Whatever materializes, a far more important determinant of the outcome of the water pollution control program is the availability of Federal grants. If they amount to $3.5 billion, it could be said with some degree of confidence that State and local governments in the aggregate will be able to finance in the required capital outlays for sewer and waste treatment facilities.

Nevertheless, particular local communities are still likely to encounter difficulty. For example, Table 3 indicates that 52 per cent of the needs are found in municipalities of less than 25,000, a population category that historically pays a higher rate of interest for its bonds.[1] This occurs in spite of the fact that the amount of credit risk involved is not directly attributable to size alone. However, the overhead costs in marketing an issue of small amount is not proportionally less than that incurred in marketing a larger sized issue. Furthermore, major investors are reluctant to purchase smaller issues for reasons of marketability or liquidity, and generally the detailed financial data required for proper analysis is unavailable. Moreover, influential bond rating agencies will not rate bonds of a locality unless that locality has a minimum amount of debt outstanding.[1] The absence of a rating, in turn, decreases investor demand.

---

[1] No estimate is currently available on the proportion of communities in the less-than-25,000 population range for which services will be provided by larger metropolitan areas (by annexation or other means).

Such factors, severally or in combination, operate to increase the interest cost of borrowed funds to small municipalities and, accordingly, jeopardize the economic feasibility of such projects and discourage the issuers from undertaking the commitments. The proportionate share of the overall requirements for waste treatment facilities which communities under 25,000 population must assume amounts to $3.6 billion. In other words, more than one-half of the total burden must be financed by a class of municipalities least able to bear the burden without assistance.

In analyzing their ability to finance waste treatment and sewer facilities, local governments must also consider costs associated with the capital outlay. This debt carries a substantial interest burden. The facilities must be maintained and operated--adding additional expenses to the overall commitment. As shown by Table 14, under the most favored terms--80 per cent Federal and State grants with debt service over a 40-year term at 4-1/2 per cent interest rate--local governments will be required to provide $680.1 million

---

[1] Moody's has followed a policy of not rating debt of governmental subdivisions unless debt outstanding totals $600,000 or more. Standard & Poor's does not rate governmental subdivisions having less than $1 million debt outstanding.

Table 14. Annual Level Debt Service and Operating and Maintenance Costs for Local Governments, Resulting from Required Capital Outlays for Municipal Waste Treatment Facilities and Sanitary Sewers, Assuming Varying Levels of State and Federal Grants Total United States, 1969-73

(in millions of dollars)

A. Required Capital Outlays, 1969-73

Year	Waste treatment facilities				Sanitary sewers Total	Total waste treatment facilities and sanitary sewers		
	Total	Net cost to local governments, assumed combined levels of State and Federal grants of--				Net cost to local governments, assuming combined levels of State and Federal grants* of--		
		30 percent	70 percent	80 percent		30 percent	70 percent	80 percent
1969	1,480.8	1,036.6	444.2	296.2	1,267.7	2,304.3	1,711.9	1,563.9
1970	1,553.6	1,087.5	466.1	310.7	1,306.4	2,393.9	1,772.5	1,617.1
1971	1,633.6	1,143.5	490.1	326.7	1,344.2	2,487.7	1,834.3	1,670.9
1972	1,721.5	1,205.0	516.5	344.3	1,385.1	2,590.1	1,901.6	1,729.4
1973	1,816.0	1,271.2	544.8	363.2	1,430.2	2,701.4	1,975.0	1,793.4
Total	8,205.5	5,743.8	2,461.7	1,641.1	6,733.6	12,477.4	9,195.3	8,374.7

* for waste treatment facilities.

Continued--

Table 14. Annual Level Debt Service and Operating and Maintenance Costs for Local Governments, Resulting from Required Capital Outlays for Municipal Waste Treatment Facilities and Sanitary Sewers, Assuming Varying Levels of State and Federal Grants

Total United States, 1969-73
(in millions of dollars)
--Continued

B. Annual Level Debt Service and Operating and Maintenance Costs

Capital outlay assuming combined levels of State and Federal grants for municipal waste treatment facilities of--	Annual level debt service on total costs, assuming interest rate of 4.5 percent/year and amortization of[a]--			Increase in O & M costs	Total costs, assuming interest rate of 4.5 percent/year and amortization of--		
	25 years	30 years	40 years		25 years	30 years	40 years
30 percent:							
1969	77.7	70.7	62.6	22.5	100.2	93.2	85.1
1970	236.1	214.9	190.3	68.1	304.2	283.0	258.4
1971	400.7	364.8	322.9	114.6	515.3	479.4	437.5
1972	572.0	520.7	460.9	160.4	732.4	681.1	621.3
1973	759.9	683.1	604.7	205.8	965.7	888.9	810.5
Total 1969-73	2,046.4	1,854.2	1,641.4	571.4	2,617.8	2,425.6	2,212.8
1974+ per annum	841.5	766.6	678.1	225.0	1,006.5	991.6	903.1
70 percent:							
1969	57.7	52.6	46.5	22.5	80.2	75.1	69.0
1970	175.2	159.5	141.2	68.1	243.3	227.6	209.3
1971	296.8	270.2	239.2	114.6	411.4	384.8	353.8
1972	422.8	384.9	340.7	160.4	583.2	545.3	501.1
1973	557.8	507.8	449.5	205.8	763.6	713.6	655.3
Total 1969-73	1,510.3	1,375.0	1,217.1	571.4	2,081.7	1,946.4	1,788.5
1974+ per annum	620.1	564.5	499.7	225.0	845.1	789.5	724.7
80 percent:							
1969	52.7	48.0	42.5	22.5	75.2	70.5	65.0
1970	156.0	145.6	128.9	68.1	224.1	213.7	197.0
1971	270.9	246.6	218.3	114.6	385.5	361.2	332.9
1972	385.5	351.0	310.7	160.4	545.9	511.4	471.1
1973	504.3	459.1	406.4	205.8	710.1	664.9	612.2
Total 1969-73	1,369.4	1,250.3	1,106.8	571.4	1,940.8	1,821.7	1,678.2
1974+ per annum	564.8	514.1	455.1	225.0	789.8	739.1	680.1

Continued--

Table 14. Annual Level Debt Service and Operating and Maintenance Costs for Local Governments,
Resulting from Required Capital Outlays for Minicipal Waste Treatment Facilities
and Sanitary Sewers, Assuming Varying Levels of State and Federal Grants
Total United States, 1969-73
(in millions of dollars)
--Continued

[a] Assumes borrowing for capital outlay in each year of the period 1969-73 will be spread evenly over the year; i. e., total debt which must be serviced in a given year equals total capital outlay of preceding years plus one-half outlay in the given year.

Sources: A: Totals for Waste Treatment Facilities and Sanitary Sewers from Table 1.

B: Increase in O & M costs, U. S. Department of the Interior, Federal Water Pollution Control Administration, unpublished data.

annually after 1973 for debt service and operating and maintenance costs. Table 15 provides a State-by-State analysis of the annual debt service cost alone, assuming the same interest rate but a 25-year spread.

Demands for capital outlays vary quite substantially State-by-State and among communities within a State. As was pointed out in Chapter I, indicated percentage increases in required capital outlays by States range from a low of 10 per cent to highs of over 350 per cent. Some difference in the response to the Federal program can be anticipated by the variance of the size of the capital requirements for such facilities. Also, while recognizing the need for pollution abatement programs, some affected units of government will have higher priorities, or encounter legal constraints as discussed in the following chapter. In short, any conclusion about the ability to finance capital outlays will be governed by whether one speaks in the aggregate or with reference to a particular unit of government.

This report did not examine the growth prospects of State and local government tax revenues or user charges to support borrowings for waste treatment and sewer facilities, nor did it consider the possible expansion of Federal grant assistance for these facilities beyond current authorizations.

Table 15. Annual Debt Service for Local Governments from Required Capital Outlays for Municipal Waste Treatment Facilities and Sanitary Sewers, Assuming Various Levels of State and Federal Grants

(in millions of dollars)

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
Alabama:				
30 percent	78.2	69.5	147.7	10.0
70 percent	33.5		103.0	7.0
80 percent	22.3		91.8	6.2
Alaska:				
30 percent	8.3	8.7	17.0	1.1
70 percent	3.5		12.2	0.8
80 percent	2.4		11.1	0.7
Arizona:				
30 percent	44.4	145.6	190.0	12.8
70 percent	19.0		164.6	11.1
80 percent	12.7		158.3	10.7
Arkansas:				
30 percent	25.8	26.8	52.6	3.5
70 percent	11.0		37.8	2.5
80 percent	7.4		34.2	2.3
California:				
30 percent	920.9	1,294.3	2,215.2	149.4
70 percent	394.7		1,689.0	113.9
80 percent	263.1		1,557.4	105.0
Colorado:				
30 percent	54.0	57.5	111.5	7.5
70 percent	23.1		80.6	5.4
80 percent	15.4		72.9	4.9

continued -

Table 15. Continued

State and level of combined State and Federal Grants[a]	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
Connecticut:				
30 percent	117.3	137.9	255.2	17.2
70 percent	50.3		188.2	12.7
80 percent	33.5		171.4	11.6
Delaware:				
30 percent	18.5	21.0	39.5	2.7
70 percent	7.9		28.9	1.9
80 percent	5.3		26.3	1.8
District of Columbia:				
30 percent	8.6	58.8	67.4	4.6
70 percent	3.7		62.5	4.2
80 percent	2.5		61.3	4.1
Florida:				
30 percent	276.9	397.5	674.4	45.5
70 percent	118.7		516.2	34.8
80 percent	79.1		476.6	32.1
Georgia:				
30 percent	124.7	112.1	236.8	16.0
70 percent	53.4		165.5	11.2
80 percent	35.6		147.7	10.0
Hawaii:				
30 percent	33.3	81.2	114.5	7.7
70 percent	14.3		95.5	6.4
80 percent	9.5		90.7	6.1
Idaho:				
30 percent	14.2	9.7	23.9	1.6
70 percent	6.1		15.8	1.1
80 percent	4.1		13.8	0.9

continued -

Table 15. Continued

State and level of combined State and Federal Grants[a]	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
Illinois:				
30 percent	215.6	228.0	443.6	29.9
70 percent	92.4		320.4	21.6
80 percent	61.6		289.6	19.4
Indiana:				
30 percent	101.0	73.0	174.0	11.7
70 percent	43.3		116.3	7.9
80 percent	28.9		101.9	6.9
Iowa:				
30 percent	34.9	13.5	48.4	3.3
70 percent	14.9		28.4	1.9
80 percent	10.0		23.5	1.6
Kansas:				
30 percent	26.3	22.0	48.3	3.3
70 percent	11.3		33.3	2.2
80 percent	7.5		29.5	2.0
Kentucky:				
30 percent	72.0	53.1	125.1	8.5
70 percent	30.9		84.0	5.7
80 percent	20.6		73.7	5.0
Louisiana:				
30 percent	115.4	157.3	272.7	18.4
70 percent	49.5		206.8	14.0
80 percent	33.0		190.3	12.8
Maine:				
30 percent	31.6	4.3	35.9	2.4
70 percent	13.5		17.8	1.2
80 percent	9.0		13.3	0.9

continued -

Table 15. Continued

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
Maryland:				
30 percent	73.7	127.0	200.7	13.5
70 percent	31.6		158.6	10.7
80 percent	21.1		148.1	10.0
Massachusetts:				
30 percent	191.2	217.3	408.5	27.5
70 percent	81.9		299.2	20.2
80 percent	54.6		271.9	18.3
Michigan:				
30 percent	355.9	207.9	563.8	38.0
70 percent	152.6		360.5	24.3
80 percent	101.7		309.6	20.9
Minnesota:				
30 percent	106.7	81.6	188.3	12.7
70 percent	45.8		127.4	8.6
80 percent	30.5		121.1	7.6
Mississippi:				
30 percent	32.2	45.6	77.8	5.2
70 percent	13.8		59.4	4.0
80 percent	9.2		54.8	3.7
Missouri:				
30 percent	126.8	321.2	448.0	30.2
70 percent	54.4		375.6	25.3
80 percent	36.2		357.4	24.1
Montana:				
30 percent	16.6	6.1	22.7	1.5
70 percent	7.1		13.2	0.9
80 percent	4.7		10.8	0.7

continued -

Table 15. Continued

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
Nebraska:				
30 percent	25.5	18.7	44.2	3.0
70 percent	11.0		29.7	2.0
80 percent	7.3		26.0	1.7
Nevada:				
30 percent	8.7	17.7	26.4	1.8
70 percent	3.7		21.4	1.4
80 percent	2.5		20.2	1.4
New Hampshire:				
30 percent	21.6	20.5	42.1	2.8
70 percent	9.2		29.7	2.0
80 percent	6.1		26.6	1.8
New Jersey:				
30 percent	333.0	423.8	756.8	51.0
70 percent	142.7		566.5	38.2
80 percent	95.1		518.9	35.0
New Mexico:				
30 percent	17.1	36.2	53.3	3.6
70 percent	7.4		43.6	2.9
80 percent	4.9		41.1	2.8
New York:				
30 percent	643.5	701.5	1,345.0	90.7
70 percent	275.8		977.3	65.9
80 percent	183.9		885.4	59.7
North Carolina:				
30 percent	55.5	82.0	137.5	9.3
70 percent	23.8		105.8	7.1
80 percent	15.9		97.9	6.6

continued -

Table 15. Continued

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
North Dakota:				
30 percent	7.6	5.4	13.0	0.9
70 percent	3.2		8.6	0.6
80 percent	2.2		7.6	0.5
Ohio:				
30 percent	285.9	272.2	558.1	37.7
70 percent	122.5		394.7	26.6
80 percent	81.7		353.9	23.9
Oklahoma:				
30 percent	31.2	45.7	76.9	5.2
70 percent	13.4		59.1	4.0
80 percent	8.9		54.6	3.7
Oregon:				
30 percent	80.2	73.2	153.4	10.3
70 percent	34.4		107.6	7.3
80 percent	22.9		96.1	6.5
Pennsylvania:				
30 percent	204.5	50.1	254.6	17.2
70 percent	87.7		137.8	9.3
80 percent	58.4		108.5	7.3
Rhode Island:				
30 percent	26.1	35.6	61.7	4.2
70 percent	11.2		46.8	3.2
80 percent	7.5		43.1	2.9
South Carolina:				
30 percent	57.7	37.2	94.9	6.4
70 percent	24.7		61.9	4.2
80 percent	16.5		53.7	3.6

continued -

Table 15. Continued

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
South Dakota:				
30 percent	7.5	4.3	11.8	0.8
70 percent	3.2		7.5	0.5
80 percent	2.1		6.4	0.4
Tennessee:				
30 percent	90.4	71.7	162.1	10.9
70 percent	38.7		110.4	7.4
80 percent	25.8		97.5	6.6
Texas:				
30 percent	171.1	407.4	578.5	39.0
70 percent	73.4		480.8	32.4
80 percent	48.9		456.3	30.8
Utah:				
30 percent	82.9	56.3	139.2	9.4
70 percent	35.5		91.8	6.2
80 percent	23.7		80.0	5.4
Vermont:				
30 percent	11.8	2.1	13.9	0.9
70 percent	5.0		7.1	0.5
80 percent	3.4		5.5	0.4
Virginia:				
30 percent	117.5	121.0	238.5	16.1
70 percent	50.4		171.4	11.6
80 percent	33.5		154.5	10.4
Washington:				
30 percent	126.5	204.0	330.5	22.3
70 percent	54.2		258.2	17.4
80 percent	36.1		240.1	16.2

continued -

Table 15. Continued

State and level of combined State and Federal Grants a/	Required Capital Outlays for Local Governments, 1969-73			Annual Debt Service on Total Net Cost (assuming interest @ 4.5% p.a. and 25-year amortization)
	Waste Treatment Facilities, net costs	Sanitary Sewers	Total Cost	
West Virginia:				
30 percent	34.8	15.0	49.8	3.4
70 percent	14.9		29.9	2.0
80 percent	9.9		24.9	1.7
Wisconsin:				
30 percent	72.1	48.5	120.6	8.1
70 percent	30.9		79.4	5.4
80 percent	20.6		69.1	4.7
Wyoming:				
30 percent	6.2	5.0	11.2	0.8
70 percent	2.6		7.6	0.5
80 percent	1.8		6.8	0.5
Total U.S.:				
30 percent	5,743.9	6,733.6	12,477.5	841.5
70 percent	2,461.7		9,195.3	620.1
80 percent	1,641.1		8,374.7	564.8

a/ 30%: 30 percent Federal grants, no State grants.
70%: 40 percent Federal grants, 30 percent State grants.
80%: 55 percent Federal grants, 25 percent State grants.

Source: Required capital outlays for local governments calculated from U.S. Department of Interior, Federal Water Pollution Control Administration, unpublished data in constant dollars, adjusted to current dollars on the basis of projected construction cost increases.

or $3.5 billion. To do so would have required a comprehensive analysis of State and local fiscal resources and judgments as to the willingness of the Congress to appropriate Federal grants for water pollution control. Nor did the report attempt to establish criteria by which a categorical judgment could be made as to the ability of any particular State or local government to finance its water control program. These also would have extended the report beyond its designative objective. What this study has done is point out that, with the stimulus of Federal financial assistance as authorized by the Clean Waters Restoration Act, both the ability and propensity of State and local government to meet the required standard will be considerably enhanced.

III. LEGAL CONSTRAINTS UPON STATE AND LOCAL GOVERNMENTS IN FINANCING REQUIRED CAPITAL OUTLAYS

Until recently, sewer and waste treatment facilities were financed almost entirely by political subdivisions and instrumentalities of the States (herein referred to as local governments).[1] The magnitude of the present water pollution control program has required State governments to reconsider past practices and to examine the necessity and feasibility of financial participation with local governments. At present more than one-half of the States have authorized, undertaken, or authorized subject to referendum, financial assistance to their local governments for installation of sewer and waste treatment facilities. Only a limited number among such States have provided, or currently propose to provide, moneys sufficient to carry out a substantial financial assistance program. Such financial assistance is customarily in the form of grants, but some States provide loans or prepayments of the anticipated Federal grant.[2]

---

[1] See JEC report, Vol. 2, p. 87. It is stated that four States offered aid for sewage treatment works and that the total amount of aid in 1962 was about $6 million.

[2] For a recent compilation of State assistance to local governments for water pollution control, see Community Action Program For Water Pollution Control, National Association of Counties, Research Foundation, Revised July, 1967, pp. 114-5.

In view of the present and prospective State financial assistance to local governments for the financing of sewer and waste treatment facilities, the problem of legal constraints must be considered with respect to States and their local governments.

The States

The primary constraint upon provision of State financial assistance to local governments is the State constitutional debt limit or referendum requirement for incurrence of debt. When the magnitude of the program and the time scheduled for its accomplishment are considered, along with the budgetary problems for other purposes, it is apparent that most States will have to look to borrowed funds to carry out a realistic program of financial assistance. However, their ability, in many instances, to borrow money for such purpose is severely impeded by constitutional limitations.

Approximately one-third of the States have constitutional prohibitions against incurrence of any debt or have limitations on the amounts that may be incurred to an extent that would not permit the funding by incurred debt of a reasonable portion of the applicable program (table 16). In addition, over 40 percent of the States require a referendum

Table 16. Constitutional Limitations on Long-Term General Obligation Debt. (Expressed as percentage of assessed valuation of taxable property.)

State[(1)]	Limit
Alabama	$300,000
Alaska	Vote required; no limit
Arizona	$350,000
Arkansas	Vote required
California	$300,000, plus voted debt
Colorado	$100,000
Connecticut	None
Delaware	(2)
Florida	Prohibited
Georgia	$500,000
Hawaii	15 per cent
Idaho	$2,000,000, plus voted debt
Illinois	$250,000, plus voted debt
Indiana	Prohibited
Iowa	$250,000, plus voted debt
Kansas	$1,000,000, plus voted debt
Kentucky	$500,000, plus voted debt
Louisiana	Prohibited
Maine	$2,000,000, plus voted debt
Maryland	None
Massachusetts	...do
Michigan	Vote required
Minnesota	None
Mississippi	...do
Missouri	$1,000,000, plus voted debt
Montana	$100,000, plus voted debt
Nebraska	$100,000
Nevada	1 per cent
New Hampshire	None
New Jersey	1 per cent of appropriation for fiscal year, plus voted debt
New Mexico	$200,000, plus voted debt; also State and county debt may not exceed 1 per cent
New York	Vote required
North Carolina	Vote required; no limit
North Dakota	$2,000,000(3)
Ohio	$750,000
Oklahoma	Vote required

Table 16. continued

Oregon	$50,000
Pennsylvania(4)	$1,000,000
Rhode Island	$50,000, plus voted debt
South Carolina	Vote required
South Dakota	$100,000, plus 0.50 per cent to develop resources
Tennessee	None
Texas	$200,000
Utah	1.50 per cent
Vermont	None
Virginia	1 per cent; vote required
Washington	$400,000, plus voted debt
West Virginia	Prohibited
Wisconsin	$100,000
Wyoming	1 per cent; vote required

(1) When the debt limit is expressed as a dollar amount, this amount is usually an authorization of debt to meet casual deficits. In addition, State constitutions almost universally authorize unlimited debt "to repel invasion or suppress insurrection."

(2) A proposed amendment relates the debt limit to the revenues of the State. Debt service on all debt must not exceed a certain percentage of the State's revenues. The percentage declines from 30 per cent of gross revenues in 1963 to 20 per cent after 1971.

(3) Proposed amendments would authorize State debt equal to 5 per cent of the taxable value of the property within the State.

(4) Proposed amendment authorizes State debt if authorized by popular vote.

Source: JEC Report, Vol. 2, pp. 153-155.

to authorize the incurrence of debt to provide requisite funds for such purposes. The balance of the States may contract debt by legislative action. The constitutional prohibitions against the incurrence of debt by the States applies similarly to the guarantee of obligations of local governments of the States.

The constitutional prohibitions against the incurrence of debt and the referendum requirements before incurrence of debt, in almost all instances, have been in effect for many years and have been found difficult, if not impossible, to change, There is a definite reluctance on the part of State officials to tamper with long-standing constitutional limitations upon the creation of general obligation debt. Further, in the case of most constitutions, the amendment process requires passage of a proposed amendment by two succeeding legislatures and ratification by the electorate.

A secondary constraint upon the provision of such financial assistance is the constitutional prohibition against the loan, gift, or grant of the credit of the State. In many States this constitutional prohibition does not apply to public corporations. In other States it applies to both public and private corporations. In some States a judicial construction of the pertinent constitutional provision has not taken place. In States where the prohibition is applicable, the State would be prohibited from borrowing money to make grants, loans, or advances to its local governments. Factors relating to the amendment of constitutional debt prohibitions and limitations noted above applies equally to the prospects of amending the constitutional prohibitions against the loan, gift, or grant of credit.

To summarize, the prospects of local governments receiving State financial assistance by way of grants, loans, or the prepayment of the anticipated Federal grants in meaningful amounts and at the times required, are as follows:

1. While the States may legally appropriate funds from current revenues for the required purposes, it cannot be anticipated that a substantial number of the States will make such appropriations.

2. Approximately one-third of the States are without constitutional authority to borrow funds for the required purposes, and the prospects for many States obtaining constitutional amendments are not encouraging.

3. Over 40 percent of the States would require the approval of the electorate to borrow funds for the required purposes. While some States have obtained such approval

and others are in the process of submission to the electorate, it cannot be anticipated that a very large number of States will obtain the requisite electorate approval during the timespan being considered.

4. In the balance of the States where funds may be borrowed for the required purposes by legislative action, based upon the number of such States that have acted to date and the programs provided, it can be reasonably anticipated that most of these States will provide a reasonable proportion of the required funds.

5. The constitutional prohibitions against the loan, gift, or grant of credit of the States is likely to place a further limitation upon the provision of borrowed funds for the required purposes in a number of States.

Local Governments

The most frequently used method of financing sewer and waste treatment facilities of local governments is the issuance of general obligation bonds secured by ad valorem taxes (See Appendix III). The magnitude of the prospective program raises the question of the available borrowing capacity of such entities in view of the legal limits on the incurrence of such indebtedness under constitutional, statutory, and charter limitations. The traditional debt limit is expressed as a percentage of the assessed valuation of the taxable property within the boundaries of the issuer. However, in some instances the same result is obtained by a limitation upon the amount of taxes that may be levied for debt purposes by the local governments.

The prospects of revising constitutional debt limits of local governments are similar, in most cases, to the constitutional debt limits of the States. However, statutory limitations on local indebtedness can readily be changed by legislative action since such limitations are merely authorizations to local governments to create debt up to the new limitations, and the burden of the actual increase in indebtedness is the responsibility of the local officials or electorate. Limitations in home rule charters generally are more difficult to change since they require the vote of the electorate.

The effect of debt limitations and referendum requirements on the ability of local governments to finance sewer and waste treatment facilities can only be determined by considering the existing debt of each unit of government, their prospective requirements for other capital purposes, the scope of their existing sewer and waste treatment facilities program, and the possible requirement of the prefinancing by a Federal or State grant.

Debt limit and referendum requirement constraints in relation to the financing of sewer and waste treatment facilities have been eased by a number of procedures which will undoubtedly be used more extensively as additional financing is required. The most direct approach has been to remove the application of the debt limit for obligations issued for sewerage purposes or to provide an additional borrowing capacity for sewerage purposes. Approximately one-fifth of the States have recognized the necessity of additional borrowing capacity by local governments for sewerage purposes and have provided the necessary exceptions (Appendix III). Other means of avoiding the debt limit and referendum requirement constraints are the creation of special districts for the sole purpose of financing sewer and waste treatment facilities or water and waste facilities and the use of revenue obligations which normally do not fall within the constitutional limitations.

The practice of creating special districts to provide limited public facilities, such as sewer and waste treatment facilities, has been sanctioned in most of the States under pertinent constitutional provisions, since such constitutional limitations upon indebtedness do not take into consideration the debts of overlapping jurisdictions and such districts either have separate or no debt limits. Special districts are used in more than half of the States to accommodate their various problems (Appendix III). An additional reason for the use of special districts is that their boundaries, within a larger county or municipal area, may correspond better to the physical problem and, accordingly, those receiving the service or benefit may contribute a more equitable share of the cost of providing the facility.

Constitutional debt restrictions have also been overcome in increasing instances by the use of revenue obligations to provide funds for the purpose of financing sewer and waste treatment facilities. Local governments in approximately three-quarters of the States have now issued revenue bonds to finance such facilities. The extent of the use of this method of financing varies widely within such States. The exercise of this power of authorization by State legislatures is not unrestricted. The courts of a limited number of States have refused to approve or have limited the application of special fund theory which excludes revenue bonds from constitutional debt limits. In cases of limited application, the courts have permitted the exclusion of bonds which are payable from the revenues of the facility constructed from the proceeds of the bonds, but have not permitted the exclusion if revenues from existing facilities which were being added to or extended were also pledged.

Even in States where constitutional limitations do not exist, local governments have not always been given full authority to issue revenue bonds to finance sewer and waste treatment facilities. This condition will undoubtedly be corrected as constitutional limitations begin to impinge on their borrowing power and as the benefits of revenue bond financing become more apparent.

A further constraint presently impairing the ability of some local governments to issue obligations is the interest rate limitation in the authorization pursuant to which such obligations must be issued. Most such authorizations have been enacted over the past 20 years when the cost of borrowing was considerably less than at present -- the representative averages of the cost of municipal borrowing presently being at or near an all-time high. Fortunately, most of the interest rate limitations are statutory and may be removed or increased by appropriate legislation. Such legislative action is presently under consideration in some jurisdictions.

The terms and conditions under which the obligations may be authorized frequently constitute additional constraints. These authorizations, generally applicable to general obligation bonds, limit the period over which the obligations mature and prescribe principal maturities that result in unequal and heavy payments in the early years of amortization. These limitations and requirements prohibit the use of a fiscal plan which could be related to the period of probable use of the facility and to debt service requirements reflecting the productive use of the facility. Many of the limitations are statutory and can be corrected by legislative action. In instances where such limitations are constitutional and not subject to ready change, the further use of revenue bond financing may solve the problem since, in most instances, the legislation authorizing the issuance of revenue bonds will contain terms and conditions that will assure the most appropriate plan of financing.

The financing of sewer and waste treatment facilities under a program contemplating Federal and State grants, in some instances, is constrained by the requirement that the local government undertaking the program have on hand the required funds prior to the undertaking of the contract obligation for the construction of the facility. The specifics of this type of requirement vary widely, some arising from constitutional and some from statutory provisions. Assuming that a local government is able to finance its share of the cost of the facility, the problem most frequently arising is the failure of the local government to have on hand by the required date the funds representing the Federal and State grants. The obvious solution to the problem would be for the local government to borrow temporarily the required funds against future payment of the grants. However, the constitutional debt restrictions come into operation where the local government is carrying out its financing program through general obligation bonds. In the case of revenue bond financing, the same constitutional problem normally does not exist, but another problem does in connection with the requirement that all funds allocated to the cost of a facility be on hand when revenue bonds are issued. This requirement is based on the fact that the revenues to pay the bonds are estimated with respect to a completed and fully financed facility.

Furthermore, a factor existing in many States that also detracts from the ability of local governments to carry out a perfected plan of financing is the lack of authorization to collect standby or availability charges from properties that may now or in the future benefit from the facility, but are not presently receiving service. A properly designed facility should anticipate future growth and provide the requisite capacity. On the other hand, current customers should not be required to pay present carrying charges on a capacity that will benefit future users who, upon connection and use, will only be required to pay a lesser overall sum. In most States, this constraint can be removed by the passage of appropriate legislation. In others there exist constitutional implications requiring individual consideration of limitations on the powers of local governments to impose taxes and other charges.

To summarize the effect of existing legal constraints on the ability of local governments to finance sewer and waste treatment facilities and the prospect of the removal or avoidance of such constraints:

1. Debt limitations and referendum requirements will continue to impede the ability of many local governments to issue general obligation bonds, although relief may be expected in some States through expansion of debt limits with respect to obligations issued for such facilities.

2. Greater use of special districts, not subject to conventional debt limits, will provide additional borrowing capacity for the purpose of financing sewer and waste treatment facilities.

3. Where debt limitations and referendum requirements are so restrictive as to impair the ability of local governments to finance such facilities, the increased use of revenue bonds will enable local governments to avoid such limitations and requirements.

4. Where constraints exist with respect to interest rate limitations and with respect to restrictive requirements on the terms and conditions upon which bonds may be issued, such constraints, if statutory, will be removed by appropriate legislation and, if constitutional, will be avoided by the employment of other means of financing.

5. Where local governments are prohibited from undertaking construction contracts until all funds required are on hand, such prohibitions, if statutory, will be removed by appropriate legislation and, if constitutional, will be avoided by the employment of other means of financing.

6. As user charges for sewer service become more extensively employed to support revenue bond financing, further authorizations for the collection of standby or availability charges will be provided.

Full consideration of the various methods available to local governments for the financing of sewer and waste treatment facilities leads to the conclusion that, in most if not all jurisdictions, legal constraints can be removed or avoided by appropriate action to permit the undertaking of the requisite financing. The justification of the use of some of these methods, as in the case of revenue bond financing, depends upon the economic feasibility of the project which, in turn, is directly related to Federal and State financial assistance.

APPENDIX I--TECHNICAL NOTES

TECHNICAL NOTE 1

Statement of the Limitations of Data Provided in the FWPCA Cost Estimate Study

Estimates of costs of treating municipal effluent to attain water quality standards which are used in this report have been adopted from the FWPCA Cost Estimate Study authorized by the Clean Water Restoration Act of 1966.

The estimates developed by the Cost Estimate Study are based upon the total costs of treatment works eligible for Federal grants assistance. It was assumed that financing of this construction to attain water quality standards will take place in the five-year period 1969-73, and that all municipal effluent will be treated in compliance with the individual State standards by 1973. Prior to the actual setting and approval of standards for all States, it was assumed that secondary types of waste treatment would be required.

Estimates of the costs of treatment works are based on the need to provide service to the total urban population of the United States and the industries discharging waste water to public sewers. Treatment works include the plant, intercepters and outfalls.

The cost of construction was phased proportionately over the five-year period. This procedure was used to illustrate possible annual increments, and as a basis for estimating annual depreciation and annual construction cost increases, although it is recognized that construction would not actually occur at a fixed rate.

Since the preparation of this report of economic impact on the effected units of government, the FWPCA Cost Estimate Study has made some revisions in the data, principally to reflect the setting and approval of primary waste treatment in some areas. Costs to states having substantial metropolitan populations for which primary waste treatment has been approved will therefore be reduced in complying with the standards. These States are California, Massachusetts, Missouri, and Nebraska. In other States where some primary waste treatment has been approved, total costs are not substantially affected. The basic data were also subsequently revised to incorporate a construction cost increment for additional capacity, which is normally included when treatment works are constructed. This would provide capacity for five years of population growth in each State beyond the 1969-73 period of the Cost Estimate Study.

These revisions have not resulted in a substantial alteration of total national costs or the associated economic impact. However, the total costs of treatment works required to attain water quality standards and the economic impact of these costs in the States of California, Massachusetts, Missouri, and

Nebraska are considered to have been substantially changed by the approval of primary waste treatment in certain metropolitan areas.

The cost estimates for sanitary sewers are based upon providing service to the urban population of the United States by 1973 in order to put these needs on the same basis as treatment works. The economic impact of the cost of controlling storm water overflows has not been assessed in this study because no time schedule for achieving such control was included in the FWPCA Cost Estimate Study.

Source: U.S. Department of the Interior, Federal Water Pollution Control Administration.

TECHNICAL NOTE 2

Methodology Employed in Projecting Construction Cost Increases

These projections were first made for each of the 20 cities for which sewer and treatment plant cost indexes are calculated by the FWPCA. The period 1950-67 was used as the historic base for the projections, with trends since 1960 given particular emphasis. A constant rate of increase for sewer construction costs was assumed for each of the projected five years. Treatment plant indexes were projected to increase at a slightly increasing rate for the five years, as suggested by the patterns observed for the national average index and for many of the State indexes since the year 1961. Index figures for the States were constructed by allocating the States among the various cities on the basis of the FWPCA "Areas of Influence". The resulting figures, each independently arrived at, were then converted to an index (1968 = 100), and the FWPCA projections of required capital outlays for the States, expressed in terms of constant 1968 dollars, were estimated accordingly, summed and divided by the national 1968 constant dollar totals to arrive at the national index, and then reconverted to the original index (1967-59 = 100). Thus, the national index figures shown in Table 3 were weighted by the relation of each State's program requirement to the national total.

TECHNICAL NOTE 3

Sources of Data and Assumptions in the JEC Series B Forecasts

A number of reports dealing with the question of State and local finances in the near future have been reviewed during the course of the present analysis. Several of these reports deal explicitly with or refer to Gross National Product projections. Of the various studies examined, including those prepared by or for the Joint Economic Committee of the Congress, National Planning Association, Center for Economic Projections, George Washington University (for the Council of State Governments), the Committee for Economic Development and the Tax Foundation, the projections prepared for the JEC are considered to be the most realistic and have been employed in this analysis.

The JEC's Series B forecasts of GNP are dependent on the following key assumptions: (1) The War in Vietnam will subside by the end of 1967, allowing some reductions in the size of the Armed Forces and the rate of expenditures thereafter; (2) The Civilian labor force will rise from 75.6 million in 1965 to 83.3 million in 1970, and to 91.0 million in 1975; (3) Average factory-hours will decline by 30 minutes per week between 1967 and 1970 and by an additional 30 minutes between 1970 and 1975; (4) Wage rates will rise at the rate of the average annual gain in output per man-hour in the private economy plus an allowance for the annual gain in consumer prices in both public and private employment; (5) Productivity--output per man-hour--will increase by 3.0 per cent per year between 1966 and 1975; (6) The unemployment rate will be 4 per cent of the labor force; (7) Prices--the GNP deflator--will rise at an annual average rate of 1.5 per cent; (8) Personal savings--the ratio to disposable income--will average 5.5 per cent.

In addition, information has been drawn from a wide variety of sources, the primary source being the unpublished date provided by the FWPCA. This consists of a series of three computer tapes on which the projected capital outlays for both sanitary sewers and municipal waste treatment facilities are phased over the five years 1969-72. These data, compiled for each State, represent the Authority's reckoning of the total construction costs necessary to attain the standards of waste-water quality called for by the Federal Water Pollution Control Act and by relevant State legislation and to accommodate the three areas of need (i.e., presently inadequate facilities, presently unmet needs, and population and industrial growth). In addition, these tapes contained information regarding the operational and maintenance expenses and depreciation charges of the required waste treatment facilities. The Authority has prepared a detailed explanation of the underlying concepts and the methodology employed in the preparation of the computer program. A great deal of information was also obtained by interviews with professionals in the Authority, particularly from the following Divisions: Construction Grants, Financial Management, and Program Review and Evaluation.

Much authoritative material regarding construction costs was obtained through discussions with various authorities from among the following organizations: The Associated General Contractors of America, the Water Pollution Control Federation, the Consulting Engineers Council, and the Waste Water and Waste Water Equipment Manufacturers Association. Personnel from the U. S. Department of Health, Education and Welfare were also extremely helpful in providing special information regarding sanitary sewer construction costs.

Other sources of information which were of particular benefit in the preparation of this study include the following:

U. S. Department of Health, Education, and Welfare, Public Health Service, Division of Water Supply and Pollution Control, Sewage Treatment Plant Construction Cost Index, 1963.

_______, Sewer Construction Cost Index, 1964.

U. S. Department of Interior, Federal Water Pollution Control Administration, Sewage and Water Works Construction, WP-15 publication series (formerly Public Health Service Publication No. 758), various years.

_______, "Sewage Treatment Plant and Sewer Construction Cost Index", (monthly mimeographed publication), various months and years.

TECHNICAL NOTE 4

Federal Grants for Sanitary Sewers and Waste Treatment Facilities Through Agencies Other Than Federal Water Pollution Control Administration

1. The Appalachian Regional Development Act of 1965 (PL 89-4, amended by PL 90-104).

   Grants available for public works, including waste treatment facilities under the following arrangements:

   Section 212 permits the U. S. Department of Commerce to increase contributions from other Federal programs in Appalachia up to 80 per cent of project costs. These funds are disbursed through the FWPCA and have been included in FWPCA data.

   Section 214 permits the U. S. Department of Commerce to give supplemental grants to communities in Appalachia to help meet their local share for public works projects in which they are eligible for other Federal funds.

2. The Public Works and Economic Development Act of 1965 (PL 89-136).

   Directs the U. S. Department of Commerce to make grants and loans for public works in economically distressed areas. EDA makes grants up to 50 per cent of project costs in designated "redevelopment areas." Supplementary grants up to 80 per cent of the project cost are available for areas which cannot meet the required matching share. The Economic Development Administration receives a total appropriation for grants to public works, which it allocates to projects which include sanitary sewers and waste treatment plants. Authorization allows $500 million to be appropriated annually for public works projects from fiscal years 1966-69.

3. The Housing and Urban Development Act of 1965 (PL 89-117), permits the U. S. Department of Housing and Urban Development to make grants and loans for basic water and sewer facilities in areas of more than 5,500 population. Grants

may be up to 50 per cent of the cost of the projects, which must be consistent with a unified urban-area development program. Authorization allows a total of $800 million to be appropriated from fiscal years 1966-69.

4. Amendments of 1965 to the Consolidated Farmers Home Adminstration Act of 1961 (PL 89-240).

   Authorizes the U. S. Department of Agriculture to make grants and insure loans for water supply and waste treatment facilities in areas of fewer than 5,500 inhabitants. Grants may be up to 50 per cent of the cost of the project.

Table 17. Federal Grants for Sanitary Sewers and Waste Treatment Facilities Through Agencies Other than the Federal Water Pollution Control Administration, Fiscal Years 1966-68

Item	Sanitary sewers				Waste treatment facilities			
	1966	1967	1968	Total 1966-67	1966	1967	1968	Total 1966-67
PL 89-14 (ARD) Section	--	--	--	--	5.2[a]	2.2[a]	[b]	7.4
PL 89-136 (EDA)	51.5[c]	41.7[c]	[d]	93.2	1.5	13.2	[d]	14.7
PL 89-117 (HUD)	48.0[e]	48.0[e]	79.2[e]	96.0	--	--	--	--
PL 89-240 (FHA)	--	--	--	--	10.0[f]	13.0[f]	15.0[f]	23.0
Total	99.5	89.7		189.2	16.7	28.4		45.1

---

[a] Approved by Appalachian Regional Commission out of appropriations for public works projects.

[b] Appropriations for 1968 not approved by November 9, 1967.

[c] Approved by Economic Development Administration out of appropriations for public works; includes grants for combined sewer and water supply projects.

[d] $175 million for total public works projects appropriated for 1968. $18.5 million has been approved for sanitary sewers and related projects in first three months of 1968. In 1967, 32 percent of appropriated $170 million for public works went to sanitary sewers, combined sewer and water supply, and waste treatment plant projects.

[e] Assumes 48 percent of appropriations for sanitary sewers and water supply projects goes for sanitary sewers.

[f] Assumes 50 percent of appropriations for water supply and waste treatment facilities goes for waste treatment facilities.

APPENDIX II--GENERAL NOTES

GENERAL NOTE 1

The Omaha Pollution Control Corporation

The major and independent meat packinghouses in the City of Omaha slaughter and process over 4 million head of cattle, sheep, and hogs annually. Considerable quantities of animal waste, resulting from the slaughter, dressing, cutting and preparation of meat products, are discharged into the municipal sewers. Grease and paunch manure constitute most of the animal waste material. Lesser quantities of meat scraps, stock-pen manure, and normal processing wastes further contribute to the total amount of annual matter transported by the sewers.

The sewage from all but one of the packinghouses flows directly into the Missouri River essentially without treatment of any kind. The Omaha Sewage Treatment Plant is completely bypassed because it cannot handle the large quantities of annual waste material (daily kill-day discharges of sewage from the packinghouses are estimated to contain at least 40 dry tons of animal fats and 70 dry tons of suspended solids). To comply with the directive of the FWPCA to stop polluting the Missouri River with such packinghouse wastes, the City was faced with the requirement of providing a system which could process the wastes and remove the grease and solids content.

The system had to permit an efficient operation of the City's main sewage treatment plant as well as preserve the advantage to its meat industry of the traditional waste water disposal methods and be economically feasible itself.

The solution devised by the City was a separate system which collected and processed[1] the sewage flow from the packinghouses so that the effluent could easily be taken by the main sewage treatment plant. The process selected met all of the criteria suggested for an ideal solution: it was reliable, permanent, economical now and in the future, sanitary, and, for functional continuity, relatively independent of labor strikes, weather, and other potential disruptions. The total cost for the plant and facilities incorporating the Carver-Greenfield process was estimated to be $6.7 million.

Omaha was approaching its debt limitation and the required capital expenditure was more than it could assume when considered together with other City needs. The packers at the same time felt that they were in no position to underwrite such an amount.

By means of a cooperative venture, the objective became attainable. A non-profit corporation was organized called the Omaha Pollution Control Corporation. It issued $5.5 million

---

1/ By a method of solids and fat processing developed by the Carver-Greenfield Corporation, Summit, New Jersey.

revenue bonds to construct the collector sewer system and treatment facility. The City contributed $1.2 million through the issuance of its general obligation bonds.[1] The corporation entered into a 30-year lease-purchase agreement with the City at a rental sufficient to retire its bonds. As soon as the bonds are retired, the facility will revert free and clear to the City. The advantages of using a non-profit corporation were that the lease-purchase agreement was deductible in figuring debt limitation, the City avoided further erosion of its borrowing power, and it was not required to increase its mill tax levy.

It is anticipated that the City will not be required to appropriate any lease payments from its general revenues. Such funds will be obtained in part from contributions of the packers based on a fixed charge for the treatment of their wastes and, in part, from the proceeds of the sale of recovered waste products (grease and dry solids) in the market. A feasibility study prepared by the Stearns-Roger Corporation, Denver, Colorado, indicated that the revenues from the sale of recovered wastes, together with the packer charges, will be sufficient to service the bonded indebtedness and provide a profit to the City after the bonds are retired.

---

[1] Applications were made by the City for Federal grants to assist in the financing of the collector sewer and the gravity separation basins. Both applications--one to the Department of Housing and Urban Development for 50% of the cost of the collector sewer system and the other to the FWPCS for 30% of the gravity basin costs except for land and easements--have been approved.

Omaha accomplished more than it really set out to do. It wanted to find a technically and economically feasible solution to its water pollution problem. In addition to developing a packinghouse waste treatment system, the cost of which has been split among the benefiting parties, Omaha found a successful way of converting an industrial and community liability into a revenue generating resource. What the City has done, in other words, from a technical and financial standpoint is record a unique pollution control achievement.1/

1/ For a detailed discussion of the Omaha project, see Meier and Korbitz, Unique Profit Potential Through Central Pretreatment of Omaha Packinghouse Waste Water, a paper delivered to the Water Pollution Control Federation, New York City, on October 12, 1967.

GENERAL NOTE 2

Trends in Municipal Bond Holdings

Among the holders of municipal securities at the end of 1965, the largest were commercial banks, personal trust funds, fire and casualty insurance companies, and "individuals and others". Altogether, such holders accounted for 83.3 per cent of total holdings of $100 billion (Table 18). Of these, commercial banks have become the largest source of municipal bond financing, accounting for 28 per cent of the net expansion of State and local government debt between 1946 and 1955 and 47 per cent of the growth during 1956-65. Fire and casualty insurance companies accounted for 14 per cent of the increase in net loans during the 1947-55 and 13 per cent during 1956-65. Personal trust funds accounted for 12 per cent during each decade, while "individuals and others" (excluding personal trust funds) declined in relative importance from 25 per cent during 1947-55 to 17 per cent during 1956-65.

The step-up in acquisitions of municipal bonds by commercial banks is attributable, to a large extent, to the effects of the amendments of Federal Reserve Regulation Q in 1961, 1963, and 1964 which raised the maximum interest rate that can be paid by commercial banks on deposits.

Municipal bonds, in relation to commercial bank loans and investments, rose from 3.8 per cent in 1946 to 12.1 per cent

Table 18. Holdings of State and Local Government Obligations by Investor Groups, 1946-75
(in billions of dollars)

Investor group	Year-end holdings				Percent change		
	1946	1955	1965	1975	1946-55	1955-65	1965-75
Commercial banks	4.4	12.7	38.7	107.5	189	205	178
Mutual savings banks	.1	.6	.3	.4	500	(-50)	33
Life insurance companies	.6	2.0	3.5	3.8	233	75	9
Fire and casualty insurance companies .	.2	4.2	11.4	21.4	2,000	171	88
State and local retirement funds . . .	.8	2.7	2.6	.5	238	(-4)	(-81)
State and local governments	1.6	2.5	2.1	1.1	56	(-16)	(-48)
Municipal bond investment funds	a/	a/	.2	2.6	--	--	1,200
Personal trust funds	3.0	6.7	13.2	33.0	123	97	150
Other financial institutions	.8	.9	1.6	2.2	13	78	38
Other corporations	.3	1.2	3.6	6.0	300	200	67
Federal credit agencies	.4	.7	2.8	5.4	75	300	93
Individuals and others	3.4	10.6	20.0	27.1	212	89	36
Total	15.6	44.8	100.0	211.0	187	123	111

---

a/ Nonexistent, 1946-60

Source: Joint Economic Committee Report, Vol. 2, p. 17.

in 1964. Analysis of the municipal security investments by commercial banks shows (1) a growing interest in revenue bonds, (2) a rising trend (especially in recent years) in investments in long-term municipal obligations (maturities over ten years), and (3) a decline since 1960 in the proportion of municipal bonds holdings represented by holdings of speculative issues or issues in default.

For fire and casualty insurance companies, municipal security investments have become increasingly important, accounting for 30 per cent of their assets in 1962. Since then the proportion of municipal securities to assets decreased to 27.4 per cent in 1965. Analysis of the municipal security investments by fire and casualty insurance companies shows (1) rising proportions of such investments in revenue bonds (almost 50 per cent in 1965), (2) a tendency to purchase longer maturities, (3) that while bond ratings are considered by some companies, many prefer to perform their own credit analysis on municipal borrowers, and (4) that intended use of bond proceeds influences purchases, but the geographical location of the borrower has little effect.

While personal trust funds have expanded their holdings of municipal bonds over the past two decades, municipal obligations as a proportion of assets have varied but little, rising from 10.4 per cent in 1946 to 13.2 per cent in 1955, and to 13.7 per cent in 1965. However, in recent years many of the commercial banks which administer these personal trusts have established common trust funds for investments in municipal bonds, with the number of such "tax-exempt" funds rising from 24 in 1962 to 104 in 1965. Analysis of personal trust holdings of municipal securities indicate (1) an increasing trend in revenue bond investments, (2) considerable investments in maturities over 20 years, (3) that while there is some reliance upon bond ratings, most trust departments prefer to do their own credit analysis, and (4) neither intended use of proceeds nor geographical location of borrower have much influence on municipal security investment decisions.

"Other corporations" have expanded their holdings of municipal securities, mainly short term, from $0.3 billion in 1946 to $1.2 billion in 1955, and to $3.6 billion in 1965. Holdings of "individuals and others", a residual calculated by subtracting all identifiable investor groups from total holdings, have grown from $3.4 billion in 1946 to $10.6 billion in 1955, and to $20 billion in 1965.

State and local public agency capital requirements for public facilities for the decade 1966-75 are estimated at $327.8 billion, of which $31.6 billion is estimated for 1970 and $40.7 billion for 1975. Annual net changes in debt are projected to rise from $8.5 billion in 1966 and to $11.3 billion in 1975. The outstanding debt is projected at $198.8 billion by 1975.

Projected holdings by investors are estimated to rise from $100 billion at the end of 1965 to $211 billion at the end of 1975 (Table 19). Annual net changes (after retirements) on these projected holdings will rise from $8 billion in 1966 to $14.3 billion in 1975. The projections for each investor group shown in Table 19 were made independently of the other projections.

The JEC study projects commercial bank holdings of municipal bonds as an average of two periods of experience, 1944-64 and 1954-64. Municipal bond holdings of commercial banks rose from $38.7 billion, or 12.6 per cent of total loans and investments, in 1965 to $115 billion, or 24.2 per cent of total loans and investments amounting to $475 billion, in 1975, on the basis of the 1944-64 experience. Based on the 1954-64 experience, total loans and investments rose to $525 billion, and municipal obligations to $100 billion. Averaging these two projections, it is estimated that by 1975 total loans and investments will amount to $500 billion, of which $107.5 billion, or 21.5 per cent, will reflect holdings of municipal securities.

It should be recognized that implicit in these projections are certain assumptions regarding the flow of savings, the

Table 19. Projected Holdings of State and Local Government Obligations, by Significant Investor Groups, 1968-75

(in billion dollars)

Investor groups	Projected							
	1968	1969	1970	1971	1972	1973	1974	1975
Total holdings	126.1	136.3	147.1	158.3	170.4	183.0	196.7	211.0
Commercial banks[a]	55.6	61.9	68.5	75.5	82.9	90.7	98.9	107.5
Mutual savings banks[b]	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4
Life insurance companies[c]	2.8	2.7	2.8	2.9	3.0	3.2	3.5	3.8
Fire and casualty insurance companies[d]	13.8	14.7	15.7	16.7	17.8	18.9	20.1	21.4
State and local public retirement funds[e]	1.7	1.5	1.3	1.1	0.9	0.7	0.6	0.5
State and local governments[f]	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
Municipal bond investment funds[g]	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6
Personal trust funds[h]	18.0	19.8	21.7	23.7	25.8	28.0	30.4	33.0
Other identifiable financial institutions[i]	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2
Other corporations[j]	4.3	4.6	4.8	5.0	5.3	5.5	5.8	6.0
Federal credit agencies[k]	3.5	3.8	4.1	4.3	4.6	4.8	5.1	5.4
Individuals and others[l]	22.1	22.8	23.5	24.2	24.9	25.7	26.4	27.1

---

[a] $68.8 billion net increase in holdings ($107.5 billion in 1975 less $38.7 billion in 1965) prorated over 10 years, assuming 5.5 percent annual rate of increase.

Continued--

Table 19. Actual and Projected Holdings of State and Local Government Obligations, by Significant Investor Groups, 1966-75 --Continued

b/ Estimated net decreases of holdings of $70 million in 1966 and $30 million in 1967; thereafter, net increases of holdings of $20 million per year.

c/ Estimated net decreases of holdings of $430 million in 1966, $200 million in 1967, and $100 million each in 1968 and 1969; thereafter, net increases of holdings at annual increments of $50 million.

d/ Estimated net increase in holdings rising from $700 million in 1966 to $1 billion in 1970 and $1.3 billion in 1975.

e/ Estimated net increase in holdings of $300 million during 1966-68, $200 million during 1969-73, and $100 million during 1974-75.

f/ Estimated net decrease in holdings of $100 million per year, 1966-75.

g/ Estimated net increase of $50 million in 1966, and rising trend of increases from $120 million in 1967 to $470 million in 1975.

h/ $19.8 billion net increase in holdings ($330 billion in 1975 less $13.2 billion in 1965) prorated over 10 years, assuming 5.5 peraent annual rate of increase.

i/ Estimated net increase by $60 million per year.

j/ Holdings estimated at $4.8 billion in 1970 and $6 billion in 1975, or an annual increase of $240 million per year.

k/ Estimated net increase by $260 million per year.

l/ Calculated as a residual by subtracting municipal bond investment funds and personal trust funds from annual increase in holdings of "households and nonprofit organizations."

Source: Joint Economic Committee, State and Local Public Facility Needs and Financing, Vol. II, p. 50.

extent to which our economy becomes a "checkless society" (which would affect the volume of demand deposits), as well as rates of growth and alternative lending opportunities. Since 1958, mutual savings banks have progressively reduced their holdings of municipal bonds so that by the end of 1965 they amounted to $320 million, compared with $729 million in December 1958. For the first nine months of 1966, these banks reduced their municipal securities holdings by another $50 million. It is estimated that mutual savings bank holdings of municipal securities will grow very slowly over the next decade to reach $400 million at the end of 1975 ($300 million in 1970).

At the end of 1965, assets of all U. S. life insurance companies aggregated $158.9 billion, of which $3.5 billion, or 2.2 per cent, were invested in municipal bonds. Analysis of the growth trend of life insurance company assets indicates that by 1975 total assets may reach $300 billion. It has been estimated that, owing to the attractiveness of alternative investments, the proportion of life insurance company assets accounted for by municipal obligations will decline to about 1.3 per cent. Given the tight money situation for many insurance companies, there is reason to expect that by the end of 1967 their holdings of municipal bonds will have dropped to $2.9 billion. Because of alternative investment opportunities, a further decline in holdings of municipal securities is expected through 1969, but thereafter life insurance companies are expected to increase their acquisitions of municipal obligations because of comparatively more attractive yields. Therefore, their holdings are expected to total $3.8 billion at the end of 1975.

Stock fire and casualty insurance companies are expected to increase their holdings of municipal securities at an annual rate of about 6 per cent, or by amounts ranging from almost $470 million in 1966 to $790 million in 1975. In the case of the mutual companies, estimated purchases of municipal securities were stated in terms of $10 million per year; i.e., 5 per cent of admitted assets will go each year into municipal bonds, or about 30 to 50 per cent of their portfolios will be invested in municipal securities. It is estimated that the net expansion in holdings of municipal securities by fire and casualty insurance companies will rise progressively from about $0.7 billion in 1966 to $1.3 billion in 1975.

GENERAL NOTE 3

Analysis of Public Borrowings

Despite the high cost of borrowing and the consequent postponement of many new offerings, the supply of outstanding tax-exempt bonds of State and local governments exceeded the hundred billion dollar mark for the first time in 1966. The volume of new issues sold by States and municipalities during 1967 reached an all-time high of $14,240,547,546, an increase of $3,151,609,197, or 28.4 per cent, from the previous high in 1966 of $11,088,938,349 (Table 20). The extremely large volume of public borrowings is occurring at a time when municipal bond yields are at their highest levels since the 1930's. There is no reason to believe that this upward trend in bond sales will level off soon. Over the 20-year period from 1947 to 1967, municipal bond sales increased from $2.4 billion to $14.2 billion. The December 1966 JEC study indicated that State and local government borrowings each year will continue at an accelerated rate, reaching $17.3 billion in 1970. At this pace, the amount of municipal obligations outstanding, now more than $100 billion, will double by 1975.

Financing Facilities: By Type of Issue

In considering practical methods for financing sewer and waste treatment facilities, the "pay-as-you-go" principle is

Table 20. Municipal Financing Volume, 1947-66
(in millions of dollars)

Year	General obligations	Revenue bonds	Total	General Obligations, Percent of total
1947...	1,963.1	385.7	2,353.8	83.6
1948...	2,440.2	549.5	2,989.7	81.6
1949...	2,312.5	683.0	2,995.4	77.2
1950...	3,093.7	599.9	3,693.6	83.8
1951...	2,548.1	730.1	3,278.2	77.7
1952...	2,937.9	1,463.5	4,401.3	66.7
1953...	3,990.6	1,567.3	5,557.9	71.8
1954...	3,754.3	3,214.4	6,968.7	53.9
1955...	4,244.1	1,732.4	5,976.5	71.0
1956...	3,775.9	1,670.5	5,446.4	69.3
1957...	4,933.2	2,024.9	6,958.1	70.9
1958...	5,628.1	1,772.3	7,400.4	76.1
1959...	5,159.7	2,521.4	7,681.1	67.2
1960...	5,034.7	2,194.8	7,229.5	69.6
1961...	5,761.5	2,598.0	8,359.5	68.9
1962...	5,892.2	2,666.0	8,558.2	68.8
1963...	6,069.2	4,037.5	10,106.7	60.1
1964...	6,879.9	3,650.8	10,530.7	65.3
1965...	7,445.0	3,639.2	11,084.2	67.2
1966...	7,012.9	4,076.0	11,088.9	63.3

Source: The Bond Buyer's Municipal Finance Statistics.

not generally adaptable because of the need to create large surpluses or reserves before undertaking construction. Essentially what State and local governments must do is borrow. Such borrowings are principally financed through the sale of general obligation and revenue bonds.

General obligation bonds are secured by the full faith and credit of the issuer and a pledge of its taxing power. The amount borrowed becomes a general obligation of the issuer and must be paid by the issuer without regard to the earmarkings of any specific fund for that purpose. There are variations within this category, such as limited tax bonds where the taxing power is limited to a specified maximum tax rate and special assessment bonds which are payable only from assessments against those who benefit from the improvement provided. The majority of special assessment bonds recently issued are additionally secured by full faith and credit as well as a pledge of taxing power of the issuer, so that they are, in effect, general obligation bonds.

The dollar volume of general obligation bond financing for all purposes rose from $2.0 billion in 1947 to $7.0 billion in 1966, but as a proportion of total bonds issued, it decreased from 83.6 to 63.3 per cent in the period (Table 20). General obligation bonds for sewer and waste treatment facilities, however, represented 73.4 per cent of all obligations issued for such purposes in 1966 (Table 21). This is consistent with the average of 72.5 per cent for the period 1963-66.

Of the general obligation bonds issued in 1966 for sewer and waste treatment purposes, 82.1 per cent were of the unlimited tax variety and 8.9 per cent were additionally secured by facility revenues or special assessment charges. Limited tax general obligation bonds represented 8.9 per cent, and 1 per cent was payable from special assessments.

Substantially more financing of sewer and waste treatment facilities is done through general obligation bonds than revenue bonds because less complicated bonding procedures are involved, there is no need to establish the economic feasibility of the project in terms of revenues, usually lower interest rates are obtained, the tax load is spread over the entire community, and there is a greater investor demand.

Revenue bonds are payable from charges, tolls, or rents by those who use the facilities constructed with the bond proceeds. The project becomes self-liquidating by the use of service charges. New issues of revenue bonds for all purposes have grown from $386 million in 1947 (16.4 per cent of the total) to $3.6 billion in 1966 (36.7 per cent). Revenue bonds issued for the purpose of financing sewer and waste treatment facilities represented 26.5 per cent of the bond market in 1966. Over the last six years the percentage has not exceeded 29.5

Table 21. Sewer Bond Sales, by Type

Type of issue	1961			1962			1963	
	No. of issues	Value		No. of issues	Value		No. of issues	Va
		Thousands of dollars	Percent		Thousands of dollars	Percent		Thousands of dollars
General obligation bonds								
Unlimited tax	435	346,565		392	342,049		437	325,236
Unlimited tax secured by:								
Utility revenue	--	--		2	1,964		5	2,005
Rental revenue	1	150		--	--		--	--
Special assessment	57	8,828		38	8,305		44	8,305
Limited tax	22	27,505		27	33,039		21	19,086
Limited tax secured by:								
Utility revenue	--	--		--	--		2	4,300
Special assessment	37	7,487		37	8,148		42	10,610
Total	552	390,535	68.6	496	393,505	66.2	551	369,542
Revenue bonds								
Utility revenue	153	175,221		106	194,609		177	153,351
Special tax revenue	3	2,020		4	6,040		4	1,326
Rental revenue	1	1,775		--	--		--	-
Total	157	179,016	31.4	110	200,648	33.8	181	154.677
Total bonds	709	569,551	100.0	606	594,154	100.0	732	524,219

Source: 1961-64, U. S. Department of Health, Education, and Welfare, Public Health Service, Publication 965;

1965-66, U. S. Department of Interior, Federal Water Pollution Control Administration, WP-16.

Bond Sales, by Type of Issue, 1961-66

1963			1964			1965			1966		
o. of issues	Value		No. of issues	Value		No. of issues	Value		No. of issues	Value	
	Thousands of dollars	Percent		Thousands of dollars	Percent		Thousands of dollars	Percent		Thousands of dollars	Percent
437	325,236		423	352,902		353	370,474		304	310,844	
5	2,005		6	9,760		--	--		6	12,882	
--	--		--	--		--	--		--	--	
44	8,305		53	15,298		28	9,720		40	20,851	
21	19,086		12	18,097		27	17,641		28	33,562	
2	4,300		2	2,371		1	265		--	--	
42	10,610		22	9,538		8	4,808		5	345	
551	369,542	70.5	518	407,966	74.1	417	402,908	72.0	383	378,484	73.4
177	153,351		141	141,710		134	147,935		98	125,013	
4	1,326		2	1,039		7	6,567		4	2,600	
--	-		--	--		4	2,086		3	9,350	
181	154.677	29.5	143	142,749	25.9	145	156,588	28.0	105	136,963	26.6
732	524,219	100.0	661	550,715	100.0	562	559,496	100.0	488	515,447	100.0

ce,

ation, WP-16.

per cent. Of the revenue bonds issued for sewer and waste treatment facilities in 1966, 91.2 per cent were payable from utility revenues and 6.8 per cent from rental revenues. This is consistent with the ratio of the past several years.

The percentage of revenue bonds issued to finance sewer and waste treatment facilities should increase in the future. This is due to several factors. Of primary significance is the narrowing spread in interest costs between general obligation and revenue bonds. In 1961, for example, the interest cost differential could be expected to be at least 1/2 of 1 per cent higher on revenue bonds. In recent years the spread has generally narrowed to a maximum of 1/4 of 1 per cent on equivalently rated issued. The reduction in interest rate spread is attributable to the issuer having incorporated strong protective covenants in the bond contract, in providing effective lien covenants, and in establishing in most cases a history of adequate earnings and payment records--all of which have induced a broader market acceptance of such issues.

Another reason why revenue bonds are attractive and their use may tend to become more widespread is that revenue bonds generally do not come under constitutional, statutory and/or charter limitations on the amount of general obligation indebtedness which may be incurred by municipal entities empowered to issue general obligation bonds. Also, it may be that no approval by the electorate is required for their issuance, and no tax increase need be voted upon. In addition, facilities built by the issuance of revenue bonds will not compete with other projects for tax revenues, and the financing is more equitable because the charge for services rendered falls upon those who benefit from the use of the facilities.

Financing Facilities: By Issuing Authority

Over the past five years, municipalities have accounted for an average of 52.2 per cent of the bond issues for sewer and waste treatment facilities, special districts have accounted for 22.4 per cent, authorities for 10.5 per cent, counties for 7.1 per cent, States for 5.2 per cent, and townships for 2.6 per cent (Table 22). While municipal governments will continue to be the dominant issuer of bonds for such facilities, it is estimated that States and authorities will begin to represent a larger share of the market. This estimate is based upon the trend of States increasingly to provide grants, the proceeds of which are derived from State bond issues, to local governments to finance their sewer and waste treatment facilities. Federal law frequently provides for larger Federal contributions to such projects if this is done, which encourages States to make such grants.

Table 22. Sewer Bond Sales, by Issuing Authority, 1962-66

(values in thousands of dollars)

Issuing authority	1962		1963		1964		1965		1966		Total		
	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	
												Thousands of dollars	Percent
State			4	17,600	6	8,495	3	103,000	5	13,540	18	142,635	5.2
County	22	38,643	19	34,750	16	42,808	22	48,001	23	30,524	102	194,726	7.1
Municipality	429	333,105	495	309,568	437	296,034	367	242,067	320	251,973	2,048	1,432,747	52.2
Township	15	12,726	16	9,978	28	11,520	16	7,460	22	29,198	97	70,882	2.6
Special district	109	134,936	119	94,123	122	153,963	105	94,728	81	137,206	536	614,956	22.4
Statutory authority	31	74,744	79	58,200	52	37.895	49	64,240	37	53,006	248	288,085	10.5
Total	606	594,154	732	524,219	661	550,715	562	559,496	488	515,447	3,049	2,744,031	100.0

Source: 1962-64, U. S. Department of Health, Education, and Welfare Public Health Service, Publication 965;

1965-66, U. S. Department of Interior, Federal Water, Pollution Control Administration, WP-16.

As a result of the creation of new authorities to assist local government to finance their sewer and waste treatment facilities, such as were recently established in New York and Nebraska,[1] this type of financing can be expected to assume a larger share of the market in the future. Special districts will also continue to represent a large percentage of the market, due to the continuing trends of suburban growth and the creation of legislation encouraging the formation of joint sewer and waste treatment facilities among communities.

Financing Facilities: By Size of Issue

In terms of the size of the bond market during the past five years, for sewer and waste treatment facilities, the highest dollar volume (26.7 per cent) was in the $2 million to $5 million range (Table 23). The next highest dollar volume (18.8 per cent) was in the $5 million to $10 million range, closely followed by a range of $1 million to $2 million (16.6 per cent). The balance (23 per cent) was among sales of less than $1 million. This group represented 77.6 per cent of the number of issues sold.

Financing Facilities: By Population of Issue

Due to incomplete reporting by the less populous communities,

---

[1] See General Note 4, Appendix II.

Table 23. Sewer Bond Sales, by Bond Issue Size, 1962-66

(values in thousands of dollars)

Size of bond issue	1962		1963		1964		1965		1966		Total			
											Issues		Value	
	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	Number	Percent	Thousands of dollars	Percent
Under $50,000	97	2,530	68	1,907	70	1,919	60	1,599	38	1,139	333	10.92	9,094	.33
$50,000-$100,000	80	5,737	108	7,911	92	6,594	63	4,494	47	3,421	390	12.79	28,157	1.03
$100,000-$200,000	86	11,738	137	18,950	110	14,944	76	10,934	97	13,498	506	16.59	70,064	2.55
$200,000-$500,000	123	37,239	172	52,619	145	45,853	123	37,709	95	30,981	658	21.58	204,401	7.45
$500,000-$1,000,000	83	54,436	115	77,826	102	68,562	108	70,918	71	48,847	479	15.71	320,589	11.68
$1,000,000-$2,000,000	52	74,446	74	100,212	77	104,564	66	90,315	66	86,286	336	11.02	455,823	16.61
$2,000,000-$5,000,000	56	167,908	38	111,059	44	133,369	53	158,407	54	161,335	245	8.04	732,078	26.68
$5,000,000-$10,000,000	22	151,610	16	103,435	18	116,410	10	62,120	13	82,740	79	2.59	516,315	18.82
Over $10,000,000	6	88,510	4	50,300	3	58,500	3	123,00	7	87,200	23	.76	407,510	14.85
Total	606	594,154	732	524,219	661	550,715	562	559,496	488	515,447	3,049	100.00	2,744,031	100.00

Source: 1961-64, U. S. Department of Health, Education, and Welfare, Public Health Service, Publication 965;

1965-66, U. S. Department of Interior, Federal Water Pollution Control Administration, WP-16 the largest volume of sewer bond financing, $528 million (23.8 per cent) remains unidentified as to the population size of the issuing body. Disregarding this factor, population categories below 25,000 now represent 21 per cent of the amount of bond sales and 50.7 per cent of the number of issues sold (Table 24). If, as some estimates state, 50 per cent of the unidentifiable volume of bond sales belong in these categories, it is conceivable that 52 per cent of the amount of bond sales will be offered by population communities of less than 25,000 through the period ending in 1973. To some degree, however, these figures could be lowered by annexations into surrounding metropolitan areas.

Financing Facilities: By Net Interest Cost Ranges

The difference in interest costs between general obligation bonds and revenue bonds for sewer and waste treatment facilities has ranged from 1/2 to 3/4 of 1 per cent although the spread has been narrowing in recent years (Table 25). During the period 1961-65, 36.7 per cent of the revenue bond issues (47.0 per cent of the dollar amount) had net interest costs ranging from 3.50 per cent to 3.75 per cent. For the same period, 36.3 per cent of the number of general obligation bonds (44.4 per cent of the dollar amount) had net interest costs ranging from 3 to 3.25 per cent.

Table 24. Sewer Bond Sales, by Size of Issuing Authority, 1962-66[a]

(Values in thousands of dollars)

Population size of issuing authority	1962		1964		1965		1966		Total			
									Issues		Value	
	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	Number	Percent	Thousand dollars	Percent
Under 10,000.........	207	51,805	331	101,467	188	54,585	148	55,842	874	37.72	263,699	11.88
10,000 - 25,000......	69	40,581	90	50,602	79	63,004	63	48,192	301	12.99	202,379	9.12
25,000 - 50,000......	42	32,272	68	50,849	46	37,721	59	52,531	215	9.28	173,373	7.82
50,000 - 100,000.....	50	60,273	54	53,372	38	54,398	35	41,491	177	7.64	209,534	9.44
100,000 - 250,000....	25	57,477	29	45,214	17	13,188	22	44,948	93	4.01	160,827	7.24
250,000 - 500,000....	20	68,262	20	70,405	18	31,995	22	30,695	80	3.45	201,357	9.07
500,000 - 1,000,000..	12	27,436	26	98,726	8	11,663	8	33,152	54	2.33	170,977	7.70
Over 1,000,000.......	17	66,233	18	57,830	13	147,180	8	38,720	56	2.42	309,963	13.96
Unidentified.........	164	189,815	25	22,250	155	145,762	123	169,876	467	20.16	527,703	23.77
Total..............	606	594,154	661	550,715	562	559,496	488	515,447	2,317	100.00	2,219,812	100.00

---

[a] 1963 not available

Source: 1961-64, U. S. Department of Health, Education and Welfare, Public Health Service, Publication 965;

1965-66, U. S. Department of Interior, Federal Water Pollution Control Administration, WP-16.

Table 25. Sewer Bond Sales, by Net Interest Cost Ranges, 1961-65

(values in thousands of dollars)

Net interest cost range midpoints	1961		1962		1963		1964		1965		Total			
											Issues		Value	
	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	No. of issues	Value	Number	Percent	Thousands of dollars	Percent
A. General Obligation Bonds														
2.000	1	120	4	4,665	2	160	--	--	--	--	7	.28	4,945	.25
2.250	1	135	13	3,113	6	1,375	--	--	--	--	20	.78	4,623	.23
2.500	9	1,675	16	16,492	17	22,178	2	267	--	--	44	1.74	40,612	2.08
2.750	32	13,984	67	62,905	74	41,875	26	27,703	9	2,588	208	8.20	148,965	7.58
3.000	63	43,153	90	97,644	130	141,474	106	125,927	72	70,153	461	18.20	478,351	24.36
3.250	90	80,962	77	76,378	84	54,685	109	100,483	99	80,720	459	18.12	393,228	20.01
3.500	93	125,870	66	40,262	58	52,567	73	73,674	78	166,639	368	14.52	459,012	23.37
3.750	55	23,395	29	30,199	44	24,282	55	21,891	40	39,947	223	8.80	139,714	7.11
4.000	53	73,280	22	34,852	16	3,868	38	20,339	30	14,707	159	6.28	147,046	7.49
4.250	27	6,047	6	478	7	1,145	11	6,978	13	4,205	64	2.52	18,853	.95
4.500	15	2,360	4	390	1	455	6	2,474	3	1,690	29	1.14	7,369	.38
4.750	7	605	3	201	2	1,870	6	2,781	3	1,384	21	.83	6,841	.35
5.000	6	1,074	--	--	--	--	2	147	--	--	8	.32	1,221	.06
5.250	1	65	--	--	1	31	1	245	2	1,450	5	.20	1,791	.09
5.500	2	312	--	--	1	300	--	--	--	--	3	.12	612	.03
5.750	1	415	--	--	--	--	--	--	--	--	1	.04	415	.02
6.000	2	186	--	--	--	--	--	--	--	--	2	.08	186	.01
6.250	1	420	--	--	--	--	--	--	--	--	1	.04	420	.02
Unknown	93	16,477	99	25,926	108	23,367	83	25,057	68	19,425	451	17.79	110,252	5.61
Total	552	390,535	496	393,505	551	369,542	518	407,966	417	402,908	2,534	100.00	1,964,456	100.00
B. Revenue Bonds														
2.500	--	--	--	--	--	--	1	3,500	--	--	1	.14	3,500	.42
2.750	3	325	1	805	--	--	--	--	--	--	4	.54	1,130	.14
3.000	3	347	5	6,888	3	3,610	--	--	1	1,900	12	1.64	12,745	1.41
3.250	7	11,010	9	35,248	7	16,708	12	25,650	7	9,715	42	5.72	98,331	11.80
3.500	10	5,070	20	59,645	20	33,168	15	19,149	22	38,507	87	11.83	155,539	18.56
3.750	21	24,831	23	44,374	49	47,202	37	54,169	53	67,260	183	24.86	237,836	28.43
4.000	20	63,350	15	17,802	18	14,107	18	9,526	24	18,141	95	12.91	122,926	14.75
4.250	25	19,870	7	5,696	17	6,197	16	12,537	12	7,170	77	10.46	51,470	6.17
4.500	17	13,790	1	13	2	825	2	392	2	667	24	3.26	15,687	1.88
4.750	3	2,062	--	--	1	192	--	--	2	440	6	.82	2,694	.32
5.000	6	2,414	--	--	--	--	1	445	1	191	8	.11	3,050	.36
5.250	1	80	--	--	--	--	--	--	--	--	1	.14	80	.10
5.500	1	215	--	--	--	--	--	--	--	--	1	.14	215	.25
Unknown	40	35,652	29	30,178	64	32,668	41	17,381	21	12,597	195	26.49	128,476	15.41
Total	157	179,016	110	200,649	181	154,677	143	142,749	145	156,588	736	100.00	833,679	100.00

Source: 1961-64, U. S. Department of Health, Education and Welfare, Public Health Service, Publication 965;

1965-66, U. S. Department of Interior, Federal Water Pollution

GENERAL NOTE 4

New York State Pure Waters Authority

Existing financial and legal constraints on local governments require the States to reexamine the status of the legal entities authorized to undertake the construction and financing of sewer and waste treatment facilities. Consideration of these matters by a limited number of States has resulted in the determination to create a public entity with requisite powers to operate on a statewide basis. Representative of such entities is the New York State Pure Waters Authority.1/

The New York State Pure Waters Authority was created to assist local governments in the planning, financing, construction, maintenance, and operation of waste treatment works, sewage collecting systems, and solid waste disposal facilities. The authorized powers of the Authority include the following:

(1) Pursuant to contract with any municipality empowered to construct sewage treatment works, sewage collecting systems or solid waste disposal facilities, to construct such facilities for such municipality.

(2) Pursuant to contract with any municipality empowered to operate and maintain sewage treatment works or solid waste

---

1/ Title 12 of Article 5 of the New York Public Authorities Law.

disposal facilities, to operate and maintain such works or facilities for such municipality.

(3) To make loans to any municipality for the construction of sewage treatment works, sewage collecting systems and solid waste disposal facilities.

(4) Pursuant to contract with any municipality empowered to construct, operate and maintain sewage treatment works or solid waste disposal facilities, to provide sewage treatment or solid waste disposal services for such municipality in sewage treatment works owned and operated by the Authority, and, when desired by any such municipality, to transfer the facilities for such services to such municipality at the close of the service contract.

(5) To provide technical advisory services to any municipality in connection with the planning, construction, operation and maintenance of sewage treatment works, sewage collecting systems and solid waste disposal facilities.

In furtherance of such functions, the Authority is authorized to purchase municipal bonds and notes issued by a municipality for the purpose of financing construction of sewage treatment works, sewage collecting systems, or solid waste disposal facilities. The Authority is also authorized to issue its own bonds and notes, to be secured by operating revenues and interest, and amortization payments on any municipal bonds and notes owned by it and obtained from the foregoing loans.

Any municipality contracting with the Authority for the construction, operation, and maintenance of municipally owned sewage treatment works would remain eligible for State aid under the State Public Health Law to the same extent as the municipality would if it were to perform those functions itself. Where the Authority provides sewage treatment works owned and operated by the Authority, the Authority is eligible to receive State assistance for the construction, operation, and maintenance of those works pursuant to the provisions of the State Public Health Law.

The stated powers of the Authority are related to the magnitude of the programs required to be undertaken by the local governments within the State and the understanding that each locality or group of localities in a region have their particular resources and also their special problems--physical, financial and technical--in carrying out the accelerated action contemplated in such program. Such powers are designed to provide assistance in mobilizing local or regional resources and in meeting such special problems. The Authority, under its powers, can ease the financial and administrative burdens on local governments in carrying out their responsibilities by (1) accumulating and providing technical expertise and experience not otherwise available to a single community; (2) distributing the costs of services over a broader base; (3) providing impartial assistance in the development and execution of multi-community projects; and (4) providing financing assistance not otherwise available or at lower debt service costs.

Under the powers of the Authority to construct waste treatment works on behalf of a local government, the Authority can apply its available superior technical knowledge and resources at lower cost to provide a better facility. Similarly, under the powers of the Authority to operate and maintain sewage treatment works on behalf of a local government, the expertise of the Authority provides more efficient operation and maintenance at lower costs.

In the exercise of the powers of the Authority to construct, operate, and maintain sewage treatment works to provide under contract with a local government for the treatment and disposal of its sewage, the Authority is enabled to handle both local and regional problems more directly and simply. In addition, the ability of the Authority to construct, operate, and maintain sewage treatment works to provide the requisite service under contract with a local government removes the concern with the ability of such local governments to finance the cost of the required treatment facility, and the undertaking of the financing by the Authority provides such financing, in most instances, at considerably reduced costs.

The power of the Authority to make loans to local governments also reduces the cost of financing to such governments since, in most instances, the credit rating of the obligations of the Authority will exceed the ratings of the obligations of the individual local governments. In addition to a preference in credit rating, the obligations of the Authority is more readily marketable than those of a single local government, as the Authority, by combining the financing of projects for a number of local governments, can provide a larger issue and a wider credit base.

The purposes for which the New York Pure Waters Authority was created, and the accomplishment of such purposes by this Authority, will undoubtedly demonstrate to many other jurisdictions the desirability of creating governmental agencies with requisite powers to operate on a statewide or regional basis.

One State, Nebraska, has already enacted a modified form of the New York legislation. The 1967 Session of the Legislatrue created the Nebraska Clean Waters Commission.1/ The essential difference between it and the New York State Pure Waters Authority is that the Nebraska legislation confines the powers of the Commission solely to the financing of sewage collection and treatment facilities for municipalities. The

---

1/ L.B. 884, Session Laws, 1967, p. 1327.

Commission is not authorized to construct, operate and maintain such facilities for a municipality as, was indicated above, may be done by the New York State Pure Waters Authority.

APPENDIX III - State-By-State Analysis of Bond Issues For Sewer and Waste Treatment Facilities

The material contained in Apendix III has been extracted from Moody's Municipal and Governmental Manual and pertains to bond issues for local governments for sewer and waste treatment facilities in the 50 States and the Commonwealth of Puerto Rico. It cannot be considered a complete catalogue of all bond issues of local governments for sewage and waste treatment facilities purposes since Moody's Manual does not attempt to rate all bond issues, particularly smaller issues, and some issues are given designations not identifiable as for sewage and waste treatment facilities. In the interest of brevity, the matters covered herein have been summarized to provide basic and general information. The contents should not be relied upon as technically accurate.

STATE OF ALABAMA

1. Nature of body issuing sewer bonds

   (a) Cities

   Twelve cities issued general obligation bonds.
   Fifteen cities issued sewer and utility combination bonds.

   (b) Utility Boards

   Five municipally created utility boards issued sewer and utility combination sewer bonds.

   (c) Waterworks and Sewer Boards

   Five legislatively created waterworks and sewer boards issued water and sewer revenue bonds.

   (d) Boards of Water and Sewer Commissioners

   Four public corporations organized by cities to provide water and sewer systems issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of municipality and, additionally, in some cases, by first pledge of all public improvement assessments levied against properties benefited or pledge of license and privilege taxes.

   (b) Revenue bonds - revenues of designated utility systems.

3. Purpose of bonds

   Most issues are combination utility bonds. The others made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   5% of assessed valuation for municipalities of less than 6000 population. If bonds for sewer purposes then 8% of assessed valuation. 7% of assessed valuation for municipalities of more than 6000 population.

STATE OF ALASKA

1. Nature of body issuing sewer bonds

   (a) Cities

   Three cities issued general obligation bonds.
   One city issued sewer revenue bonds.

   (b) The Greater Anchorage Area Borough which encompasses an area of 1260 square miles issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   None.

STATE OF ARIZONA

1. Nature of body issuing sewer bonds

   (a) Cities

   Nine cities issued sewer general obligation bonds.
   Five cities issued water and sewer general obligation bonds.
   Six cities issued water and sewer revenue bonds.

   (b) County Sanitary District

   One county sanitary district issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of the water and sewer systems.

3. Purpose of bonds

   One issue was for sewage collection and another for sewage treatment. The rest made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   4% of value of assessed property without election.
   10% of value of assessed property with election.
   15% of value of assessed property with election if for sewer system owned by municipality.

STATE OF ARKANSAS

1. Nature of body issuing sewer bonds

    (a) Cities

    Nine cities issued sewer revenue bonds.
    Five cities issued water and sewer revenue bonds.

    (b) Sewer District

    One sewer district issued assessment general obligation bonds.

2. Security pledged

    (a) General obligation bonds - taxing power of issuing body.

    (b) Revenue bonds - revenues of sewer or water system.

3. Purpose of bonds

    No distinction made between sewage collection and sewage treatment.

4. Debt limitation

    Arkansas limits local government debt through a tax rate limit which is $5 for $1,000 of assessed property value.

STATE OF CALIFORNIA

1. Nature of body issuing sewer bonds

(a) Cities

Fifty-four cities issued general obligation bonds.
Fourteen cities issued sewer revenue bonds.

(b) Districts

1. County Water Districts

Seven county water districts issued general obligation bonds.
One county water district issued sewer revenue bonds.

2. County Sanitation Districts

Fifty-one county sanitation districts issued general obligation bonds.
One county sanitation district issued sewer revenue bonds.

3. Municipal Utility Districts

Two municipal utility districts issued sewer general obligation bonds.

4. Community Service Districts

Two community service districts issued sewer general obligation bonds.
One community service district issued sewer revenue bonds.

5. Municipal Improvement District

One municipal improvement district issued sewer general obligation bonds.

6. Municipal Sewer Districts

Two municipal sewer districts issued sewer general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   Six issues were for sewage treatment. The remaining issues make no distinction between sewage treatment and sewage collection.

4. Debt limitation

   No municipality shall incur any indebtedness which exceeds the income and revenues provided for such year without the assent of 2/3 of the qualified electors thereof.

STATE OF COLORADO

1. Nature of body issuing sewer bonds

   (a) Cities

   Five cities issued general obligation bonds.
   Thirteen cities issued sewer revenue bonds.

   (b) Districts

   Two sanitation districts issued general obligation bonds.
   The Denver Sewage Disposal District issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - secured by pledge of net revenues of the system or district.

3. Purpose of bonds

   Three issues were for sewage treatment. The rest made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   Cities or towns - 3% of assessed valuation, with election.

STATE OF CONNECTICUT

1. Nature of body issuing sewer bonds

   (a) Municipalities (cities or towns)

   Forty-nine municipalities issued general obligation bonds.
   One municipality issued sewer revenue bonds.

   (b) Hartford County Metropolitan District issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose bonds

   Nine issues designated for sewage treatment. The rest made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   2 1/4 times annual receipts from taxation averaged for last three preceding years.
   3 3/4 times annual receipts from taxation averaged for last three preceding years if indebtedness is for sewer purposes and if approved by state tax commissioner.

STATE OF DELAWARE

1. Nature of body issuing sewer bonds

   (a) Cities

   Three cities issued general obligation bonds. One city issued sewer and water general obligation bonds.

   (b) Counties

   One county issued general obligation bonds.

2. Security pledged

   General obligation bonds - taxing power of issuing body.

3. Purpose of bonds

   One issue was for sewage treatment. The others made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   None.

STATE OF FLORIDA

1. Nature of body issuing sewer bonds

   (a) Cities

   Fourteen cities issued general obligation bonds. Twenty-three cities issued sewer revenue bonds. Thirty-eight cities issued water and sewer revenue bonds.

   (b) Counties

   Two counties issued water and sewer revenue bonds.

   (c) Sanitary Districts

   Four sanitary districts issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body and additionally, in some cases, by cigarette taxes.

   (b) Revenue bonds - revenues of various systems and additionally, in some cases, by cigarette and utility taxes.

3. Purpose of bonds

   Two issues were for sewage treatment. The rest make no distinction between sewage treatment and sewage collection.

4. Debt limitation

   (a) Non-chartered cities and towns - 10% of assessed valuation.

   (b) Chartered cities - debt may not exceed levy assessed against property to be improved.

STATE OF GEORGIA

1. Nature of body issuing sewer bonds

   (a) Cities

   Thirteen cities issued sewer general obligation bonds.
   Three cities issued water and sewer general obligation bonds.
   Thirty-one cities issued water and sewer revenue bonds.

   (b) Counties

   Three counties issued general obligation bonds.
   Three counties issued water and sewer revenue bonds.

   (c) County Water Authority

   One county water authority issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of various systems.

3. Purpose of bonds

   Three issues designated for sewage treatment. The others made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   Municipalities and counties - 7% of assessed value of taxable property.

STATE OF HAWAII

1. Nature of body issuing sewer bonds

   One city issued general obligation bonds.

2. Security pledged

   Taxing power of the city.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   10% of assessed valuation of property.

STATE OF IDAHO

1. Nature of body issuing sewer bonds

   (a) Cities

   Two cities issued general obligation bonds.
   One city issued sewer revenue bonds.
   Three cities water and sewer revenue bonds.

   (b) Sewer District

   One sewer district issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of various systems.

3. Purpose of bonds

   One issue was for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   Cities - 10% of value of assessed property therein.

STATE OF ILLINOIS

1. Nature of body issuing sewer bonds

   (a) Cities

   Twenty-one cities issued general obligation bonds.
   Twenty-one cities issued sewer revenue bonds.
   Thirty-six cities issued water and sewer revenue bonds.

   (b) Sanitary Districts

   Fifteen sanitary districts issued general obligation bonds.
   Two sanitary districts issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of various systems.

3. Purpose of bonds

   Four issues for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   Municipalities and counties - 5% of value of taxable property therein.
   2 1/2% of value of taxable property therein if municipality has less than 300,000 population, but not applicable if indebtedness is for sewer system.

STATE OF INDIANA

1. Nature of body issuing sewer bonds

   (a) Cities

   Five cities issued general obligation bonds.
   Forty-six cities issued sewer revenue bonds.

   (b) Sanitary Districts

   Five sanitary districts issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   Two issues were for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   Municipalities - 2% of value of taxable property.

STATE OF IOWA

1. Nature of body issuing sewer bonds

   Twenty-five cities issued general obligation bonds. Seventeen cities issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   One issue was for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   5% of actual property value within municipalities and counties.

STATE OF KANSAS

1. Nature of body issuing sewer bonds

   (a) Cities

   Twenty-four cities issued general obligation bonds.
   Nine cities issued sewer revenue bonds.
   Two cities issued water and sewer revenue bonds.

   (b) Sewer Districts

   Three sewer districts issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system and in some cases revenues of both water and sewer system.

3. Purpose of bonds

   Thirteen issues were for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   (a) Counties - 1% of property assessed for taxation.

   (b) Cities - less than 60,000 population - 15% of property assessed for taxation; 25% of property assessed for taxation if indebtedness is for sewers

   60,000 to 120,000 population - 2% of property assessed for taxation; 15% of property assessed for taxation if indebtedness is for utilities.

   over 120,000 population - 8% of property assessed for taxation; 17% of property assessed for taxation if indebtedness is for utilities.

STATE OF KENTUCKY

1. Nature of body issuing sewer bonds

   (a) Cities

   Five cities issued general obligation bonds.
   Eleven cities issued sewer revenue bonds.
   Twenty-five cities issued water and sewer revenue bonds.

   (b) Sanitation Districts

   Three sanitation districts issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of designated systems.

3. Purpose of bonds

   Two issues were for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   (a) Cities

   1st class, 2nd class and 3rd class with more than 15,000 population - 10% of value of assessed property therein.

   3rd class with less than 15,000 population and 4th class - 5% of value of assessed property therein.

   5th class and 6th class - 3% of value of assessed property therein.

   (b) Counties

   2% of value of assessed property therein.

STATE OF LOUISIANA

1. Nature of body issuing sewer bonds

   (a) Cities

   Twenty-seven cities issued general obligation bonds.
   Seven cities issued water and sewer revenue bonds.
   One city issued gas and sewer revenue bonds.

   (b) Sewage Districts

   Thirteen sewage districts issued general obligation bonds.
   Three sewage districts issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of appropriate utility systems.

3. Purpose of bonds

   Two issues were for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   Municipalities - 10% of assessed valuation of taxable property.

STATE OF MAINE

1. Nature of body issuing sewer bonds

   (a) Cities

   Four cities issued general obligation bonds.

   (b) Sewer Districts

   Three sewer districts issued general obligation bonds.

2. Security pledged

   Taxing power of issuing body.

3. Purpose of bonds

   No distinction made between sewage treatment and sewage collection.

4. Debt limitation

   7.5% of assessed valuation.

STATE OF MARYLAND

1. Nature of body issuing sewer bonds

    (a) Cities

    Ten cities issued general obligation bonds.

    (b) Sanitary District

    Seven sanitary districts issued general obligation bonds.

2. Security pledged

    (a) Municipal general obligation bonds - taxing power of issuing body.

    (b) Sanitary district general obligation bonds - bonds are guaranteed as to both principal and interest by the county commissioners wherein the districts lie. They are payable from charges against the property in the districts benefited and by taxes on assessable property in the district, if necessary.

3. Purpose of bonds

    Three issues designated for sewage disposal. All the rest made no distinction between sewage collection and sewage treatment.

4. Debt limitation

    None.

COMMONWEALTH OF MASSACHUSETTS

1. Nature of body issuing sewer bonds

(a) Cities

Forty-three cities issued general obligation bonds.

(b) Sewer Districts

Two sewer districts issued general obligation bonds.

2. Security pledged

Taxing power of issuing body.

3. Purpose of bonds

Five issues designated for sewage disposal. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

(a) Cities

2 1/2% of the average of assessed valuation of taxable property for the three preceding years. 5% with approval of emergency finance board.

(b) Towns

5% of the average of assessed valuation of taxable property for the three preceding years. 10% with approval of emergency finance board.

STATE OF MICHIGAN

1. Nature of body issuing sewer bonds

   Sixty-nine cities and counties issued general obligation bonds.

   Twenty-five cities and counties issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   Fifty-one issues designated for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   Cities and counties - 10% of value of assessed property therein.

STATE OF MINNESOTA

1. Nature of body issuing sewer bonds

   (a) Cities

   Fifty-one cities issued general obligation bonds. Five cities issued sewer revenue bonds.

   (b) Sanitary District

   One sanitary district issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds of municipalities - taxing power of municipality issuing the bonds.

   (b) General obligation bonds of the sanitary district - net revenues of sanitary sewer system and, in case of insufficient revenues, the full faith, credit and taxing powers of district without limitation as to rate or amount.

3. Purpose of bonds

   Nineteen issues designated for sewage disposal. The remaining issues make no distinction between sewage treatment and sewage collection.

4. Debt limitation

   10% of assessed property valuation within municipality if allowed by municipal charter, 5% otherwise.

STATE OF MISSISSIPPI

1. Nature of body issuing sewer bonds

   Six cities issued general obligation bonds.
   Seventeen cities issued water and sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of municipality.

   (b) Revenue bonds - revenues of the water and sewer system.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   15% of assessed valuation.

STATE OF MISSOURI

1. Nature of body issuing sewer bonds

   (a) Cities

   Twenty-one cities issued general obligation bonds. Seventeen cities issued revenue bonds.

   (b) The Metropolitan St. Louis Sewer District issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system and in some cases revenues of both water and sewer system.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   5% of value of taxable property in municipality.

STATE OF MONTANA

1. Nature of body issuing sewer bonds

Three cities issued general obligation bonds.
Three cities issued sewer revenue bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

Two issues designated for sewage disposal. Two issues designated for sewage treatment. The otherissues did not distinguish between sewage treatment and sewage collection.

4. Debt limitation

According to Constitution the municipal debt limitation is 5% of the value of taxable property in the municipality. However, this limit may be extended by the Legislature by authorizing municipal corporations to submit the question to the taxpayers affected when such increase is necessary to construct a sewage system.

STATE OF NEBRASKA

1. Nature of body issuing sewer bonds

   One city issued general obligation bonds.
   Nine cities issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   (a) Counties - 10% of value of assessed property therein.

   (b) Cities over 200,000 population - 5% of value of assessed property therein.

STATE OF NEVADA

1. Nature of body issuing sewer bonds

   (a) Cities

   Six cities issued general obligation bonds.

   (b) Sanitary Districts

   Two sanitary districts issued general obligation bonds.

2. Security pledged

   Taxing power of issuing body.

3. Purpose of bonds

   Sewer bonds - no distinction made between sewage collection and sewage treatment.

4. Debt limitation

   City bond debt may not exceed 30% of assessed valuation.

STATE OF NEW HAMPSHIRE

1. Nature of body issuing sewer bonds

   Three cities issued general obligation bonds.
   Twelve cities issued state guaranteed sewer bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) State guaranteed sewer bonds - unconditionally guaranteed as to principal and interest by the state.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   (a) Cities - 1.75% of last assessed valuation. Indebtedness for sewage systems not limited.

   (b) Counties - 2% of last assessed valuation. Indebtedness for sewage systems not limited.

STATE OF NEW JERSEY

1. Nature of body issuing sewer bonds

(a) Cities

Sixty-four cities issued general obligation bonds. One city issued sewer revenue bonds.

(b) Sewer District Authorities

Twenty-nine sewer district authorities issued sewer revenue bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - payable from and secured by sewer system revenues. In some cases revenue bonds are additionally secured by guarantees of municipalities served.

3. Purpose of bonds

Twenty-two issues were for sewage treatment. The other issues do not distinguish between sewage treatment and sewage collection.

4. Debt limitation

(a) Counties

2% of average valuation of taxable real estate for last three preceding years.

(b) Municipalities

3 1/2% of average valuation of taxable real estate for last three preceding years.

STATE OF NEW MEXICO

1. Nature of body issuing sewer bonds

   Eleven cities issued general obligation sewer bonds.
   Twelve cities issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of the sewer system.

3. Purpose of bonds

   Sewer bonds - no distinction made between sewage collection and sewage treatment.

4. Debt limitation

   4% of assessed valuation, but no limitation if sewer bonds.

STATE OF OHIO

1. Nature of body issuing sewer bonds

   (a) Cities

   Eighty-six cities issued general obligation bonds.
   Thirty-five cities issued sewer revenue bonds.

   (b) Counties

   Sixteen counties issued general obligation bonds.
   Five counties issued revenue bonds.

   (c) Sanitary Districts

   One county sanitary sewer district issued sewer revenue bonds.
   One county sanitary sewer district issued general obligation bonds.

   (d) Sewer Authority

   One sewer authority issued revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - payable solely from and secured by a first lien on and pledge of the net revenues of the sewer system and, in some issues, by a first mortgage on sewer system.

3. Purpose of bonds

   Twelve issues designated for sewer treatment plants.
   Three issues designated for sewer collection. The remaining issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   (a) Cities

   1 1/2% of property in city listed and assessed for taxation if no election.

STATE OF OHIO
(continued)

7% of property in city listed and assessed for taxation if approved by electors.

(b) Counties

3% of first $100,000,000 assessed valuation; 1 1/2% of valuation in excess of $100,000,000 but not in excess of $300,000,000; 2 1/2% of the tax list valuation in excess of $300,000,000.

STATE OF OKLAHOMA

1. Nature of body issuing sewer bonds

   Twenty-nine cities issued general obligation bonds.

2. Security pledged

   Taxing power of issuing body.

3. Purpose of bonds

   Eight issues designated for sewage disposal plants. All the rest made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   5% of municipal assessed valuation, with election.

STATE OF NORTH DAKOTA

1. Nature of body issuing sewer bonds

   Three cities issued general obligation bonds.
   Six cities issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - payable solely from and secured by a first lien on and pledge of the net revenues of the waterworks and sewer system.

3. Purpose of bonds

   No distinction made between sewage treatment and sewage collection.

4. Debt limitation

   5% of assessed property valuation in cities without election.
   8% of assessed property valuation in cities with election.

STATE OF NORTH CAROLINA

1. Nature of body issuing sewer bonds

   (a) Cities

   Fifty cities issued general obligation bonds.

   (b) Sanitary Districts

   Four sanitary districts have been created by resolution and they issued general obligation bonds.

2. Security pledged

   General obligation bonds - taxing power of issuing body.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   10% of assessed valuation of municipality, but this does not apply to sewer bond debt.

STATE OF NEW YORK

1. Nature of body issuing sewer bonds

   (a) Cities and counties

   Eighty cities and counties issued general obligation bonds.

   (b) Bronx Valley Sanitary Sewer District issued general obligation bonds.

   (c) Buffalo Sewer Authority issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Bronx Valley Sanitary Sewer District bonds are direct obligations of Westchester County. The bonds are obligations of the county payable solely out of special taxes levied against property within Bronx Valley Sanitary Sewer District.

   (c) Buffalo Sewer Authority general obligation bonds are secured by sewer and water taxes levied by the City of Buffalo.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   (a) Counties

   Nassau County - 10% of average full valuation.
   Any other county - 7% of average full valuation.

   (b) Municipalities

   City of New York - 10% of average full valuation.
   Other cities having more than 125,000 inhabitants - 9% of average full valuation.
   Towns or villages - 7% of average full valuation.

STATE OF OREGON

1. Nature of body issuing sewer bonds

(a) Cities

Seventeen cities issued general obligation bonds.
One city issued sewer revenue bonds.
Two cities issued combination general obligation and revenue bonds.

(b) Sanitary Districts

Five sanitary districts have been organized as municipal corporations and they issued general obligation bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - revenues of sewer system.

(c) General obligation and revenue bonds - payable from net revenues of sewer system and then from ad valorem taxes as necessary.

3. Purpose of bonds

Two issues for sewage treatment, five issues for sewage disposal. All the remaining issues make no distinction between sewage treatment and sewage collection.

4. Debt limitation

The amount of any sewer self-liquidating bonds shall not be within any limitation of indebtedness fixed by law or charter, but shall be in addition thereto. However, the aggregate thereof shall not exceed 15% of the latest assessed valuation of the issuing city.

COMMONWEALTH OF PENNSYLVANIA

1. Nature of body issuing sewer bonds

(a) Cities

Sixteen cities issued general obligation bonds.

(b) Sanitary Authorities

One hundred thirty-five sanitary authorities have been created by municipalities. These authorities issue both revenue and assessment bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - payable solely from rentals derived from the lease of the sewer system to the municipality. Some issues are secured directly by the revenues of the sewer system.

3. Purpose of bonds

Sewage treatment is the purpose of eleven issues. All the remaining issues make no distinction between sewage treatment and sewage collection.

4. Debt limitation

7% of assessed value of property in city with voter approval or 2% without voter approval.

COMMONWEALTH OF PUERTO RICO

The Puerto Rico Aqueduct and Sewer Authority, an instrumentality of the Government of Puerto Rico, owns, operates and is further developing a complete sewer system for Puerto Rico. It has issued revenue bonds secured by water and sewer revenues.

STATE OF RHODE ISLAND

1. Nature of body issuing sewer bonds

   (a) Cities

   Fourteen cities issued general obligation bonds.

   (b) Sanitary District

   One sanitary district has been created by a municipality and it issues general obligation bonds.

2. Security pledged

   Taxing power of issuing body.

3. Purpose of bonds

   One issue for sewage disposal, one for sewer and pollution abatement. The rest of the issues make no distinction between sewage collection and sewage treatment.

4. Debt limitation

   3% of taxable property in city or town.

STATE OF SOUTH CAROLINA

1. Nature of body issuing sewer bonds

   (a) Cities

   Six cities issued general obligation bonds.
   Three cities issued sewer revenue bonds.
   Eight cities issued water and sewer revenue bonds.
   Six cities issued combined public utility revenue bonds.

   (b) Sewer Districts

   Six sewer districts issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds of the sewer districts - taxing power of the counties in which the districts lie.

   (b) General obligation bonds of the cities - taxing power of the cities.

3. Purpose of bonds

   Two issues designated for sewage disposal. All the rest made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   8% of assessed valuation of taxable property in the cities.

STATE OF SOUTH DAKOTA

1. Nature of body issuing sewer bonds

Two cities issued sewer general obligation bonds.
Four cities issued water and sewer general obligation bonds.
One city issued water and sewer revenue bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - revenues of utility systems.

3. Purpose of bonds

Two issues were for sewage treatment. The other issues make no distinction between sewage treatment and sewage collection.

4. Debt limitation

Counties, cities and towns - 5% of assessed value of taxable property therein.

STATE OF TENNESSEE

1. Nature of body issuing sewer bonds

   (a) Cities and towns

   Fourteen cities and towns issued sewer general obligation bonds.
   Three cities and towns issued water and sewer general obligation bonds.
   Seven cities and towns issued sewer revenue bonds.
   Nine cities and towns issued water and sewer revenue bonds.
   Twenty-four cities and towns issued sewer revenue and tax bonds.

   (b) The Metropolitan Government of Nashville and Davidson County issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of various systems.

   (c) Revenue and tax bonds - revenues of sewer system and unlimited tax, if necessary.

3. Purpose of bonds

   Two issues designated for sewage treatment. The other issues made no distinction between sewage collection and sewage treatment.

4. Debt limitation

   (a) Cities and towns - 10% of value of assessed property.

   (b) Cities of less than 290,000 population - 15% of value of assessed property.

STATE OF TEXAS

1. Nature of body issuing sewer bonds

Thirty-five cities issued sewer general obligation bonds.
Thirty-three cities issued water and sewer general obligation bonds.
Twelve cities issued sewer revenue bonds.
Eighty-two cities issued water and sewer revenue bonds.
Four cities issued electric, water and sewer revenue bonds.
Two cities issued gas and sewer revenue bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - revenues of the various systems.

3. Purpose of bonds

Five issues were for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

Texas uses a tax rate limitation to limit local debt.

(a) Cities over 5,000 population - no tax for any year shall exceed 2 1/2% of the taxable property therein.

(b) Cities under 5,000 population - no tax for any year shall exceed 1 1/2% of the taxable property therein.

STATE OF UTAH

1. Nature of body issuing sewer bonds

   (a) Cities

   Two cities issued sewer general obligation bonds.
   One city issued water and sewer general obligation bonds.
   Two cities issued sewer revenue bonds.
   Two cities issued water and sewer revenue bonds.

   (b) Sewer Improvement Districts

   Two improvement districts issued sewer general obligation bonds.
   One improvement district issued water and sewer general obligation bonds.

   (c) Sanitary Districts

   Three sanitary districts issued general obligation bonds.
   Four sanitary districts issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of respective systems.

3. Purpose of bonds

   One issue for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   (a) Municipalities - 4% of taxable property.

   (b) Counties - 2% of taxable property.

STATE OF VERMONT

1. Nature of body issuing sewer bonds

   Four cities issued general obligation bonds.

2. Security pledged

   General obligation bonds - taxing power of issuing body.

3. Purpose of bonds

   Four issues were for sewage treatment purposes.

4. Debt limitation

   A municipal corporation may not incur any indebtedness which, with its previously contracted indebtedness, shall exceed ten times the amount of the last grand list of such municipal corporation.

STATE OF VIRGINIA

1. Nature of body issuing sewer bonds

   (a) Cities

   Nineteen cities issued sewer general obligation bonds.
   Eleven cities issued water and sewer general obligation bonds.
   Five cities issued sewer revenue bonds.
   Two cities issued water and sewer revenue bonds.

   (b) Counties

   Three counties issued sewer general obligation bonds.
   Two counties issued water and sewer general obligation bonds.

   (c) Sanitary Districts

   Five sanitary districts issued sewer general obligation bonds.
   Two sanitary districts issued water and sewer general obligation bonds.

   (d) Sanitation Authority

   One sanitation authority issued sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of various systems.

3. Purpose of bonds

   Ten issues were for sewage treatment. The other issues made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   Cities and counties - 18% of value of assesses property.

STATE OF WASHINGTON

1. Nature of body issuing sewer bonds

   (a) Cities

   Five cities issued general obligation bonds.
   Four cities issued sewer revenue bonds.
   Nineteen cities issued water and sewer revenue bonds.

   (b) Sewer Districts

   Seven sewer districts issued sewer revenue bonds.

   (c) Seattle Sewage System issued revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of utility systems.

3. Purpose of bonds

   No distinction made between sewage collection and sewage treatment.

4. Debt limitation

   Counties and municipalities - 1 1/2% of taxable property without election. 5% of taxable property with election.

STATE OF WEST VIRGINIA

1. Nature of body issuing sewer bonds

   Two cities issued general obligation bonds.
   Nine cities issued sewer revenue bonds.
   Eight cities issued water and sewer revenue bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system and in some cases revenues of both water and sewer system.

3. Purpose of bonds

   Designated only as sewer bonds, no distinction made between sewage collection and sewage treatment.

4. Debt limitation

   Counties and cities - 5% of value of taxable property.

STATE OF WISCONSIN

1. Nature of body issuing sewer bonds

   (a) Cities

   Nineteen cities issued general obligation bonds. Seven cities issued revenue bonds.

   (b) Sewerage Districts

   Three sewerage districts issued general obligation bonds.

2. Security pledged

   (a) General obligation bonds - taxing power of issuing body.

   (b) Revenue bonds - revenues of sewer system.

3. Purpose of bonds

   Three issues were for sewage treatment. The others made no distinction between sewage treatment and sewage collection.

4. Debt limitation

   5% of full property valuation.

STATE OF WYOMING

1. Nature of body issuing sewer bonds

Three cities issued general obligation bonds.
One city issued sewer revenue bonds.
One city issued water and sewer revenue bonds.

2. Security pledged

(a) General obligation bonds - taxing power of issuing body.

(b) Revenue bonds - revenues of utility system.

3. Purpose of bonds

No distinction made between sewage collection and sewage treatment.

4. Debt limitation

Municipalities and counties -

2% of assessed value of property.
6% of assessed value of property if indebtedness for sewer purposes.

APPENDIX IV--TABLES

Table 26 Municipal Waste Treatment Facilities and Sanitary Sewers, Construction Contract Awards, 1962-66, and Required Capital Outlays, 1969-73, by States
(millions of dollars)

State	Construction Contract Awards						Required Capital Outlays											
	Current dollars						Constant 1968 dollars						Current dollars					
	1962	1963	1964	1965	1966	Total 1962-66	1969	1970	1971	1972	1973	Total 1969-73	1969	1970	1971	1972	1973	Total 1969-73
Alabama																		
Tr....................	3.2	13.3	9.2	4.8	3.9	34.4	20.0	20.4	20.8	21.1	21.5	103.8	20.6	21.4	22.3	23.2	24.2	111.7
Sw....................	5.6	4.9	9.0	2.4	2.3	24.2	13.0	13.0	13.0	13.0	13.0	65.0	13.3	13.6	13.9	14.2	14.5	69.5
Total....................	8.8	18.2	18.2	7.2	6.2	58.6	33.0	33.4	33.8	34.1	34.5	168.8	33.9	35.0	36.2	37.4	38.7	181.2
Alaska																		
Tr....................	0.0	1.2	1.3	0.7	0.3	3.5	2.0	2.0	2.1	2.2	2.3	10.6	2.1	2.1	2.3	2.5	2.8	11.8
Sw....................	0.9	2.0	2.4	0.5	0.7	6.5	1.6	1.6	1.6	1.6	1.6	8.0	1.6	1.7	1.7	1.8	1.9	8.7
Total....................	0.9	3.2	3.7	1.2	1.0	10.0	3.6	3.6	3.7	3.8	3.9	18.6	3.7	3.8	4.0	4.3	4.7	20.5
Arizona																		
Tr....................	2.1	10.2	6.0	4.7	2.9	25.9	10.8	11.1	11.3	11.6	11.9	56.7	11.2	11.9	12.6	13.4	14.3	63.4
Sw....................	3.8	3.6	1.5	2.7	4.5	16.1	26.7	26.7	26.7	26.7	26.7	133.5	27.5	28.3	29.1	29.9	30.8	145.6
Total....................	5.9	13.8	7.5	7.4	7.4	42.0	37.5	37.8	38.0	38.3	38.6	190.2	38.7	40.2	41.7	43.3	45.1	209.0
Arkansas																		
Tr....................	2.8	8.8	7.2	5.7	11.3	35.8	6.4	6.5	6.6	6.7	6.8	33.0	6.6	6.9	7.3	7.8	8.2	36.8
Sw....................	1.0	2.8	2.8	1.8	0.8	9.2	4.9	4.9	4.9	4.9	4.9	24.5	5.0	5.2	5.4	5.5	5.7	26.8
Total....................	3.8	11.6	10.0	7.5	12.1	45.0	11.3	11.4	11.5	11.6	11.7	57.5	11.6	12.1	12.7	13.3	13.9	63.6
California																		
Tr....................	58.3	23.8	19.8	29.9	56.0	187.8	226.6	230.9	235.2	239.4	243.7	1,175.8	233.9	247.3	261.8	277.7	294.9	1,315.6
Sw....................	34.7	27.5	31.8	34.8	34.3	163.1	234.9	234.9	234.9	234.9	243.9	1,174.5	242.4	250.4	258.6	267.1	275.8	1,294.3
Total....................	93.0	51.3	51.6	64.7	90.3	350.9	461.5	465.8	470.1	474.3	478.6	2,350.3	476.3	497.7	520.4	544.8	570.7	2,609.9
Colorado																		
Tr....................	2.6	4.4	19.8	5.9	7.7	40.4	13.8	14.1	14.3	14.6	14.8	71.6	14.1	14.8	15.3	16.1	16.8	77.1
Sw....................	1.5	2.1	0.8	3.1	1.1	8.6	10.4	10.4	10.4	10.4	10.4	52.0	10.7	11.1	11.5	11.9	12.3	57.5
Total....................	4.1	6.5	20.6	9.0	8.8	49.0	24.2	24.5	24.7	25.0	25.2	123.6	24.8	25.9	26.8	28.0	29.1	134.6
Connecticut																		
Tr....................	7.9	4.6	7.6	10.7	12.6	43.4	29.1	29.6	30.1	30.6	31.1	150.5	30.1	31.6	33.4	35.3	37.2	167.6
Sw....................	8.3	11.0	9.6	14.5	12.6	56.0	25.0	25.0	25.0	25.0	25.0	125.0	25.8	26.7	27.5	28.5	29.4	137.9
Total....................	16.2	15.6	17.2	25.2	25.2	99.4	54.1	54.6	55.1	55.6	56.1	275.5	55.9	58.3	60.9	63.8	66.6	305.5
Delaware																		
Tr....................	1.7	1.2	2.3	1.1	4.8	11.1	4.7	4.8	4.9	5.0	5.0	24.4	4.8	5.0	5.3	5.6	5.7	26.4
Sw....................	0.3	1.0	1.2	0.4	0.4	3.3	3.9	3.9	3.9	3.9	3.9	19.5	4.0	4.1	4.2	4.3	4.4	21.0
Total....................	2.0	2.2	3.5	1.5	5.2	14.4	8.6	8.7	8.8	8.9	8.9	43.9	8.8	9.1	9.5	9.9	10.1	47.4
District of Columbia																		
Tr....................	12.4	12.0	4.0	1.6	5.0	35.0	2.2	2.3	2.3	2.3	2.3	11.4	2.3	2.4	2.5	2.5	2.6	12.3
Sw....................	1.4	3.0	1.3	1.2	2.9	9.8	10.7	10.7	10.7	10.7	10.7	53.5	11.0	11.4	11.8	12.1	12.5	58.8
Total....................	13.8	15.0	5.3	2.8	7.9	44.8	12.9	13.0	13.0	13.0	13.0	64.9	13.3	13.8	14.3	14.6	15.1	71.1
Florida																		
Tr....................	16.7	18.5	9.2	16.0	9.5	69.9	69.4	71.2	72.9	74.6	76.3	364.4	71.3	74.7	78.5	83.2	87.9	395.6
Sw....................	15.0	16.5	15.9	17.9	11.3	76.6	73.7	73.7	73.7	73.7	73.7	368.5	75.5	77.5	79.4	81.5	83.6	397.5
Total....................	31.7	35.0	25.1	33.9	20.8	146.5	143.1	144.9	146.6	148.3	150.0	732.9	146.8	152.2	157.9	164.7	171.5	793.1
Georgia																		
Tr....................	5.5	12.8	12.5	8.1	8.7	47.6	31.9	32.4	32.9	33.4	33.9	164.5	32.7	34.1	35.5	37.1	38.7	178.1
Sw....................	2.7	3.6	4.7	4.1	4.2	19.3	20.8	20.8	20.8	20.8	20.8	104.0	21.3	21.9	22.4	23.0	23.5	112.1
Total....................	8.2	16.4	17.2	12.2	12.9	66.9	52.7	53.2	53.7	54.2	54.7	268.5	54.0	56.0	57.9	60.1	62.2	290.2

(Continued)

Table 26 Municipal Waste Treatment Facilities and Sanitary Sewers,
Construction Contract Awards, 1962-66, and Required Capital Outlays, 1969-73, by States
(millions of dollars)

(Continued)
2.

State	Construction Contract Awards						Required Capital Outlays											
	Current dollars						Constant 1968 dollars						Current dollars					
	1962	1963	1964	1965	1966	Total 1962-66	1969	1970	1971	1972	1973	Total 1969-73	1969	1970	1971	1972	1973	Total 1969-73
Hawaii																		
Tr.	6.5	8.8	5.0	2.8	4.8	27.9	8.1	8.3	8.5	8.7	8.9	42.5	8.3	8.9	9.5	10.1	10.8	47.6
Sw.	1.0	2.1	0.9	0.0	0.0	4.0	14.6	14.6	14.6	14.6	14.6	73.0	15.1	15.7	16.2	16.8	17.4	81.2
Total	7.5	10.9	5.9	2.8	4.8	31.9	22.7	22.9	23.1	23.3	23.5	115.5	23.4	24.6	25.7	26.9	28.2	128.8
Idaho																		
Tr.	1.0	0.9	0.4	2.2	0.9	5.4	3.6	3.6	3.7	3.7	3.7	18.3	3.7	3.8	4.1	4.3	4.4	20.3
Sw.	1.1	0.9	0.2	0.3	0.4	2.9	1.8	1.8	1.8	1.8	1.8	9.0	1.8	1.9	1.9	2.0	2.1	9.7
Total	2.1	1.8	0.6	2.5	1.3	8.3	5.4	5.4	5.5	5.5	5.5	27.3	5.5	5.7	6.0	6.3	6.5	30.0
Illinois																		
Tr.	30.0	53.8	20.9	37.9	23.8	166.4	53.9	54.9	55.9	56.8	57.8	279.3	55.5	58.3	61.4	64.6	68.2	308.0
Sw.	12.0	13.2	15.4	11.1	24.6	76.3	42.1	42.1	42.1	42.1	42.1	210.5	43.2	44.4	45.6	46.8	48.0	228.0
Total	42.0	67.0	36.3	49.0	48.4	242.7	96.0	97.0	98.0	98.9	99.9	489.8	98.7	102.7	107.0	111.4	116.2	536.0
Indiana																		
Tr.	35.5	11.2	9.3	17.8	11.7	85.5	25.4	25.8	26.3	26.7	27.2	131.4	26.1	27.3	28.8	30.2	31.9	144.3
Sw.	8.5	10.9	14.2	7.9	9.3	50.8	13.4	13.4	13.4	13.4	13.4	67.0	13.8	14.2	14.6	15.0	15.4	73.0
Total	44.0	22.1	23.5	25.7	21.0	136.3	38.8	39.2	39.7	40.1	40.6	198.4	39.9	41.5	43.4	45.2	47.3	217.3
Iowa																		
Tr.	4.9	8.3	5.9	9.0	9.4	37.5	8.9	9.0	9.0	9.1	9.2	45.2	9.2	9.6	9.9	10.3	10.8	49.8
Sw.	3.6	4.3	3.0	5.2	4.8	20.9	2.5	2.5	2.5	2.5	2.5	12.5	2.6	2.6	2.7	2.8	2.8	13.5
Total	8.5	12.6	8.9	14.2	14.2	58.4	11.4	11.5	11.5	11.6	11.7	57.7	11.8	12.2	12.6	13.1	13.6	63.3
Kansas																		
Tr.	3.5	6.1	3.4	3.6	10.8	27.4	6.9	6.9	7.0	7.1	7.2	35.1	7.0	7.2	7.5	7.8	8.1	37.6
Sw.	6.5	6.7	4.2	5.9	5.3	28.6	4.1	4.1	4.1	4.1	4.1	20.5	4.2	4.3	4.4	4.5	4.6	22.0
Total	10.0	12.8	7.6	9.5	16.1	56.0	11.0	11.0	11.1	11.2	11.3	55.6	11.2	11.5	11.9	12.3	12.7	59.6
Kentucky																		
Tr.	4.2	18.6	12.4	4.3	4.0	43.5	18.2	18.5	18.8	19.1	19.4	94.0	18.7	19.6	20.5	21.5	22.6	102.9
Sw.	5.1	13.5	9.2	6.6	7.2	41.6	9.7	9.7	9.7	9.7	9.7	48.5	10.0	10.3	10.6	10.9	11.3	53.1
Total	9.3	32.1	21.6	10.9	11.2	85.1	27.9	28.2	28.5	28.8	29.1	142.5	28.7	29.9	31.1	32.4	33.9	156.0
Louisiana																		
Tr.	10.7	29.9	11.3	1.9	11.2	65.0	27.2	27.9	28.6	29.2	29.9	142.8	29.7	31.2	32.9	34.6	36.5	164.9
Sw.	2.9	15.4	4.5	4.5	12.8	40.1	28.6	28.6	28.6	28.6	28.6	143.0	29.5	30.5	31.4	32.4	33.5	157.3
Total	13.6	45.3	15.8	6.4	24.0	105.1	55.8	56.5	57.2	57.8	58.5	285.8	59.2	61.7	64.3	67.0	70.0	322.2
Maine																		
Tr.	1.4	3.3	4.3	2.3	5.7	17.0	7.9	8.1	8.3	8.5	8.7	41.5	8.1	8.5	9.0	9.5	10.0	45.1
Sw.	0.4	1.5	0.4	0.4	0.3	3.0	0.8	0.8	0.8	0.8	0.8	4.0	0.8	0.8	0.9	0.9	0.9	4.3
Total	1.8	4.8	4.7	2.7	6.0	20.0	8.7	8.9	9.1	9.3	9.5	45.5	8.9	9.3	9.9	10.4	10.9	49.4
Maryland																		
Tr.	8.5	10.7	15.7	15.9	12.9	63.7	18.0	18.7	19.5	20.2	20.9	97.3	18.4	19.6	21.0	22.4	23.9	105.3
Sw.	6.4	8.7	10.1	11.0	9.5	45.7	23.1	23.1	23.1	23.1	23.1	115.5	23.8	24.6	25.4	26.2	27.0	127.0
Total	14.9	19.4	25.8	26.9	22.4	119.4	41.1	41.8	42.6	43.3	44.0	212.8	42.2	44.2	46.4	48.6	50.9	232.3
Massachusetts																		
Tr.	16.8	21.0	9.4	11.8	8.7	67.7	49.2	49.8	50.4	51.0	51.6	252.0	50.4	52.3	54.4	56.8	59.2	273.1
Sw.	8.0	10.1	9.8	7.0	9.9	44.8	40.1	40.1	40.1	40.1	40.1	200.5	41.2	42.3	43.4	44.6	45.8	217.3
Total	24.8	31.1	19.2	18.8	18.6	112.5	89.3	89.9	90.5	91.1	91.7	452.5	91.6	94.6	97.8	101.4	105.0	490.4

(Continued)

Table 26 Municipal Waste Treatment Facilities and Sanitary Sewers,
Construction Contract Awards, 1962-66, and Required Capital Outlays, 1969-73, by States
(millions of dollars)

State	Construction Contract Awards						Required Capital Outlays											
	Current dollars						Constant 1968 dollars						Current dollars					
	1962	1963	1964	1965	1966	Total 1962-66	1969	1970	1971	1972	1973	Total 1969-73	1969	1970	1971	1972	1973	Total 1969-73
Michigan																		
Tr.	48.2	17.4	18.3	13.9	18.5	116.3	89.4	90.8	92.2	93.7	95.1	461.2	92.1	96.4	101.2	106.5	112.3	508.5
Sw.	13.9	19.4	26.4	23.5	25.3	108.5	38.4	38.4	38.4	38.4	38.4	192.0	39.4	40.5	41.5	42.7	43.8	207.9
Total	62.1	36.8	44.7	37.4	43.8	224.8	127.8	129.2	130.6	132.1	133.5	653.2	131.5	136.9	142.7	149.2	156.1	716.4
Minnesota																		
Tr.	7.4	18.3	10.1	16.1	15.1	67.0	26.9	27.3	27.7	28.1	28.5	138.5	27.7	29.0	30.4	31.9	33.5	152.5
Sw.	10.2	9.7	12.4	10.0	13.7	56.0	15.0	15.0	15.0	15.0	15.0	75.0	15.4	15.9	16.3	16.8	17.2	81.6
Total	17.6	28.0	22.5	26.1	28.8	123.0	41.9	42.3	42.7	43.1	43.5	213.5	43.1	44.9	46.7	48.7	50.7	234.1
Mississippi																		
Tr.	4.0	6.3	4.2	7.9	3.6	26.0	7.7	7.9	8.1	8.3	8.5	40.5	8.3	8.7	9.1	9.7	10.2	46.0
Sw.	1.9	5.3	2.0	1.4	1.2	11.8	8.3	8.3	8.3	8.3	8.3	41.5	8.5	8.8	9.1	9.3	9.9	45.6
Total	5.9	11.6	6.2	9.3	4.8	37.8	16.0	16.2	16.4	16.6	16.8	82.0	16.8	17.5	18.2	19.0	20.1	91.6
Missouri																		
Tr.	8.0	19.6	20.1	21.9	40.9	110.5	31.3	32.1	33.0	33.8	34.6	164.8	32.2	34.0	36.1	38.3	40.6	181.2
Sw.	8.6	7.7	7.3	6.2	6.3	36.1	58.6	58.6	58.6	58.6	58.6	293.0	60.3	62.1	63.6	66.4	68.8	321.2
Total	16.6	27.3	27.4	28.1	47.2	146.6	89.9	90.7	91.6	92.4	93.2	457.8	92.5	96.1	99.7	104.7	109.4	502.4
Montana																		
Tr.	2.8	0.8	1.1	1.0	1.4	7.1	4.2	4.2	4.2	4.3	4.3	21.2	4.3	4.5	4.7	5.0	5.2	23.7
Sw.	0.2	2.5	0.4	0.4	0.6	4.1	1.1	1.1	1.1	1.1	1.1	5.5	1.1	1.2	1.2	1.3	1.3	6.1
Total	3.0	3.3	1.5	1.4	2.0	11.2	5.3	5.3	5.3	5.4	5.4	26.7	5.4	5.7	5.9	6.3	6.5	29.8
Nebraska																		
Tr.	9.2	2.7	4.5	5.3	3.9	25.6	6.6	6.7	6.8	6.9	7.0	34.0	6.7	7.0	7.3	7.6	7.9	36.5
Sw.	2.7	3.7	3.4	2.4	3.8	16.0	3.5	3.5	3.5	3.5	3.5	17.5	3.6	3.7	3.7	3.8	3.9	18.7
Total	11.9	6.4	7.9	7.7	7.7	41.6	10.1	10.2	10.3	10.4	10.5	51.5	10.3	10.7	11.0	11.4	11.8	55.2
Nevada																		
Tr.	2.1	1.3	6.1	2.7	5.7	17.9	2.1	2.1	2.2	2.2	2.3	10.9	2.2	2.3	2.5	2.6	2.8	12.4
Sw.	0.2	0.1	0.1	0.2	0.4	1.0	3.2	3.2	3.2	3.2	3.2	16.0	3.3	3.4	3.5	3.7	3.8	17.7
Total	2.3	1.4	6.2	2.9	6.1	18.9	5.3	5.3	5.4	5.4	5.5	26.9	5.5	5.7	5.0	6.3	6.6	30.1
New Hampshire																		
Tr.	1.5	5.9	2.3	2.9	3.3	15.9	5.5	5.6	5.7	5.8	5.8	28.4	5.6	5.9	6.2	6.4	6.7	30.8
Sw.	0.2	0.8	0.5	0.4	0.6	2.5	3.8	3.8	3.8	3.8	3.8	19.0	3.9	4.0	4.1	4.2	4.3	20.5
Total	1.7	6.7	2.8	3.3	3.9	18.4	9.3	9.4	9.5	9.6	9.6	47.4	9.5	9.9	10.3	10.6	11.0	51.3
New Jersey																		
Tr.	14.2	19.6	23.8	22.8	13.6	94.0	83.0	84.5	86.0	87.5	89.0	430.0	85.6	90.0	94.7	99.8	105.6	475.7
Sw.	13.2	19.1	26.9	19.9	9.9	89.0	77.3	77.3	77.3	77.3	77.3	386.5	79.6	82.1	84.8	87.2	90.1	423.8
Total	27.4	38.7	50.7	42.7	23.5	183.0	160.3	161.8	163.3	164.8	166.3	816.5	165.2	172.1	179.5	187.0	195.7	899.5
New Mexico																		
Tr.	3.1	3.9	4.7	5.6	4.7	22.0	4.4	4.5	4.6	4.6	4.7	22.8	4.5	4.7	4.9	5.1	5.3	24.5
Sw.	0.3	1.1	1.8	1.4	0.7	5.3	6.6	6.6	6.6	6.6	6.6	33.0	6.8	7.0	7.2	7.5	7.7	36.2
Total	3.4	5.0	6.5	7.0	5.4	27.3	11.0	11.1	11.2	11.2	11.3	55.8	11.3	11.7	12.1	12.6	13.0	60.7
New York																		
Tr.	44.9	70.7	39.6	21.4	34.6	211.2	159.1	162.3	165.4	168.6	171.8	827.2	164.2	173.2	182.9	193.7	205.3	919.3
Sw.	20.7	37.1	23.7	22.8	26.4	130.7	127.4	127.4	127.4	127.4	127.4	637.0	131.5	135.8	140.1	144.7	149.4	701.5
Total	65.6	107.8	63.3	44.2	61.0	341.9	286.5	289.7	292.8	296.0	299.2	1,464.2	295.7	309.0	323.0	338.4	354.7	1,620.8

(Continued)

Table 26. Municipal Waste Treatment Facilities and Sanitary Sewers,
Construction Contract Awards, 1962-66, and Required Capital Outlays, 1969-73, by States
(millions of dollars)

(Continued)
4.

State	Construction Contract Awards						Required Capital Outlays											
	Current dollars						Constant 1968 dollars						Current dollars					
	1962	1963	1964	1965	1966	Total 1962-66	1969	1970	1971	1972	1973	Total 1969-73	1969	1970	1971	1972	1973	Total 1969-73
North Carolina																		
Tr.	13.7	8.4	27.2	21.4	12.5	83.2	14.2	14.4	14.6	14.9	15.1	73.2	14.5	15.1	15.8	16.6	17.3	79.3
Sw.	4.3	3.9	7.6	5.4	9.3	30.5	15.2	15.2	15.2	15.2	15.2	76.0	15.6	16.0	16.4	16.8	17.2	82.0
Total	18.0	12.3	34.8	26.8	21.8	113.7	29.4	29.6	29.8	30.1	30.3	149.2	30.1	31.1	32.2	33.4	34.5	161.3
North Dakota																		
Tr.	1.0	1.0	0.5	0.6	2.5	5.6	1.9	1.9	1.9	2.0	2.0	9.7	2.0	2.0	2.1	2.3	2.4	10.8
Sw.	0.3	0.7	0.4	0.4	1.6	3.4	1.0	1.0	1.0	1.0	1.0	5.0	1.0	1.1	1.1	1.1	1.1	5.4
Total	1.3	1.7	0.9	1.0	4.1	9.0	2.9	2.9	2.0	3.0	3.0	14.7	3.0	3.1	3.2	3.4	3.5	16.2
Ohio																		
Tr.	18.8	22.4	19.8	38.2	27.4	126.6	72.0	73.2	74.5	75.8	77.1	372.6	74.0	77.4	81.4	85.5	90.1	408.4
Sw.	19.7	19.3	27.4	21.4	22.0	109.8	49.4	49.4	49.4	49.4	49.4	247.0	50.8	52.3	53.8	55.3	60.0	272.2
Total	38.5	41.7	47.2	59.6	49.4	236.4	121.4	122.6	123.9	125.2	126.5	619.6	124.8	129.7	135.2	140.8	150.1	680.6
Oklahoma																		
Tr.	2.7	9.4	5.5	3.3	2.8	23.7	8.1	8.2	8.3	8.5	8.6	41.7	8.3	8.5	8.8	9.3	9.7	44.6
Sw.	1.6	5.3	3.0	1.8	2.1	13.8	8.5	8.5	8.5	8.5	8.5	42.5	8.7	8.9	9.1	9.4	9.6	45.7
Total	4.3	14.7	8.5	5.1	4.9	37.5	16.6	16.7	16.8	17.0	17.1	84.2	17.0	17.4	17.9	18.7	19.3	90.3
Oregon																		
Tr.	4.7	8.4	3.5	6.0	6.4	29.0	19.7	20.1	20.5	20.9	21.3	102.5	20.4	21.5	22.8	24.2	25.7	114.6
Sw.	3.2	2.8	4.8	5.1	10.4	26.3	13.4	13.4	13.4	13.4	13.4	67.0	13.8	14.2	14.6	15.1	15.5	73.2
Total	7.9	11.2	8.3	11.1	16.8	55.3	33.1	33.5	33.9	34.3	34.7	169.5	34.2	35.7	37.4	39.3	41.2	187.8
Pennsylvania																		
Tr.	25.7	39.7	20.2	30.9	20.6	137.1	52.9	53.2	53.6	54.0	54.4	268.1	54.3	56.1	58.2	60.5	63.1	292.2
Sw.	25.9	32.9	29.3	33.3	33.8	155.2	9.2	9.2	9.2	9.2	9.2	46.0	9.5	9.7	10.0	10.3	10.6	50.1
Total	51.6	72.6	49.5	64.2	54.4	292.3	62.1	62.4	62.8	63.2	63.6	314.1	63.8	65.8	68.2	70.8	73.7	342.3
Puerto Rico																		
Tr.	2.9	2.4	2.5	1.8	1.3	10.9	na	na	na	na	na	na	na	na	na	na	na	na
Sw.	0.1	2.3	0.6	na	0.0	3.0	na	na	na	na	na	na	na	na	na	na	na	na
Total	3.0	4.7	3.1	1.8	1.3	13.9	na	na	na	na	na	na	na	na	na	na	na	na
Rhode Island																		
Tr.	0.0	10.9	1.7	0.1	1.1	13.8	6.6	6.7	6.9	7.0	7.1	34.3	6.8	7.0	7.5	7.8	8.2	37.3
Sw.	0.7	5.1	1.3	1.5	1.6	10.2	6.6	6.6	6.6	6.6	6.6	33.0	6.8	6.9	7.1	7.3	7.5	35.6
Total	0.7	16.0	3.0	1.6	2.7	24.0	13.2	13.3	13.5	13.6	13.7	67.3	13.6	13.9	14.6	15.1	15.7	72.9
South Carolina																		
Tr.	2.9	6.4	4.5	6.2	7.7	27.7	14.7	15.0	15.2	15.4	15.7	76.0	15.1	15.8	16.4	17.1	18.0	82.4
Sw.	1.3	3.5	2.0	3.2	2.0	12.0	6.9	6.9	6.9	6.9	6.9	34.5	7.1	7.3	7.4	7.6	7.8	37.2
Total	4.2	9.9	6.5	9.4	9.7	39.7	21.6	21.9	22.1	22.3	22.6	110.5	22.2	23.1	23.8	24.7	25.8	119.6
South Dakota																		
Tr.	1.2	0.7	0.5	4.2	0.9	7.5	1.9	1.9	1.9	1.9	2.0	9.6	2.0	2.0	2.1	2.2	2.4	10.7
Sw.	0.2	0.5	0.2	0.2	0.4	1.5	0.8	0.8	0.8	0.8	0.8	4.0	0.8	0.8	0.9	0.9	0.9	4.3
Total	1.4	1.2	0.7	4.4	1.3	9.0	2.7	2.7	2.7	2.7	2.8	13.6	2.8	2.8	3.0	3.1	3.3	15.0
Tennessee																		
Tr.	6.4	9.4	11.4	12.7	14.7	54.6	22.8	23.4	23.9	24.5	25.0	119.6	23.3	24.5	25.7	27.1	28.5	129.1
Sw.	5.3	7.8	10.9	8.7	16.1	48.8	13.3	13.3	13.3	13.3	13.3	66.5	13.6	14.0	14.3	14.7	15.1	71.7
Total	11.7	17.2	22.3	21.4	30.8	103.4	36.1	36.7	37.2	37.8	38.3	186.1	36.9	38.5	40.0	41.8	43.6	200.8

(Continued)

Preceding page blank

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73

(in million current dollars)

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Alabama							
Upgrading[a]......	7.4	1.6	6.9	2.6	17.1	--	35.6
Unmet needs[b].....	16.8	5.2	--	11.8	8.0	--	41.8
Pop. increase[c]...	4.1	0.0	--	10.2	3.3	0.8	18.4
Total..........	28.3	6.8	6.9	24.6	28.4	0.8	95.8
Alaska							
Upgrading........	--	--	1.1	--	0.2	--	1.3
Unmet needs......	0.9	2.7	0.3	4.1	--	--	8.0
Pop. increase....	--	0.3	0.1	1.8	--	--	2.2
Total..........	0.9	3.0	1.5	5.9	0.2	--	11.5
Arizona							
Upgrading........	4.0	0.7	--	--	--	--	4.7
Unmet needs......	--	--	--	--	28.3	--	28.3
Pop. increase....	0.4	--	4.1	--	14.8	--	19.3
Total..........	4.4	0.7	4.1	--	43.1	--	52.3
Arkansas							
Upgrading........	8.7	1.9	0.6	--	2.3	--	13.5
Unmet needs......	--	--	--	4.9	--	--	4.9
Pop. increase....	--	0.1	3.2	4.5	0.2	1.2	9.2
Total..........	8.7	2.0	3.8	9.4	2.5	1.2	27.6

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,00 and over	Unknown	Total
California							
Upgrading........	22.1	1.9	45.1	36.9	385.0	--	491.0
Unmet needs......	269.0	--	3.0	203.9	--	--	475.9
Pop. increase....	10.1	9.5	23.8	89.4	51.3	14.3	198.4
Total..........	301.2	11.4	81.9	330.2	436.3	14.3	1,165.3
Colorado							
Upgrading........	4.0	0.8	0.6	--	22.4	--	27.8
Unmet needs......	17.5	--	--	1.8	--	--	19.3
Pop. increase....	0.1	1.2	2.9	6.8	1.9	4.6	17.5
Total..........	21.6	2.0	3.5	8.6	24.3	4.6	64.6
Connecticut							
Upgrading........	9.0	4.7	20.4	9.0	34.1	--	77.2
Unmet needs......	23.5	--	--	32.0	--	--	55.5
Pop. increase....	1.3	1.0	8.8	5.6	--	--	16.7
Total..........	33.8	5.7	29.2	46.6	34.1	--	149.4
Delaware							
Upgrading........	2.8	1.0	0.5	--	10.0	--	14.3
Unmet needs......	--	0.5	0.4	3.8	--	--	4.7
Pop. increase....	0.3	--	0.2	1.3	--	3.2	5.0
Total..........	3.1	1.5	1.1	5.1	10.0	3.2	24.0
District of Columbia							
Upgrading........	--	--	--	--	--	--	--
Unmet needs......	--	--	--	--	--	--	--
Pop. increase....	--	--	--	--	3.0	--	3.0
Total..........	--	--	--	--	3.0	--	3.0

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community						
	Less than 5,000	5,000 9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Florida							
Upgrading........	8.5	1.8	18.0	2.3	21.5	--	52.1
Unmet needs......	169.2	--	--	38.0	14.4	--	221.6
Pop. increase....	8.6	8.4	8.2	10.1	8.0	35.1	78.4
Total..........	186.3	10.2	26.2	50.4	43.9	35.1	352.1
Georgia							
Upgrading........	17.9	2.2	7.3	--	30.4	--	57.8
Unmet needs......	46.5	6.5	--	12.7	--	--	65.7
Pop. increase....	1.0	3.2	6.6	1.7	9.0	9.1	30.6
Total..........	65.4	11.9	13.9	14.4	39.4	9.1	154.1
Hawaii							
Upgrading........	1.8	0.6	0.8	--	1.4	--	4.6
Unmet needs......	15.6	--	1.3	--	15.8	--	32.7
Pop. increase....	--	--	1.7	0.8	1.0	3.0	6.5
Total..........	17.4	0.6	3.8	0.8	18.2	3.0	43.8
Idaho							
Upgrading........	3.1	2.1	6.6	--	--	--	11.8
Unmet needs......	--	--	--	3.0	--	--	3.0
Pop. increase....	--	1.1	0.4	1.0	--	--	2.5
Total..........	3.1	3.2	7.0	4.0	--	--	17.3
Illinois							
Upgrading........	20.6	7.5	14.2	5.5	4.9	--	52.7
Unmet needs......	63.7	24.0	24.8	--	--	--	112.5
Pop. increase....	4.5	2.2	18.3	15.1	1.0	17.1	58.2
Total..........	88.8	33.7	57.3	20.6	5.9	17.1	223.4

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Indiana							
Upgrading........	10.3	3.2	22.0	6.2	1.7	--	43.4
Unmet needs......	45.6	--	--	2.6	1.9	--	50.1
Pop. increase....	2.6	1.0	4.0	--	5.3	6.5	19.4
Total..........	58.5	4.2	26.0	8.8	8.9	6.5	112.9
Iowa							
Upgrading........	3.6	0.5	5.0	7.5	7.5	--	24.1
Unmet needs......	--	--	--	--	--	--	--
Pop. increase....	0.7	1.3	0.5	2.9	0.5	--	5.9
Total..........	4.3	1.8	5.5	10.4	8.0	--	30.0
Kansas							
Upgrading........	6.4	0.4	8.5	--	0.2	--	15.5
Unmet needs......	--	--	--	--	0.4	--	0.4
Pop. increase....	1.1	1.7	1.4	1.7	3.2	0.6	9.7
Total..........	7.5	2.1	9.9	1.7	3.8	0.6	25.6
Kentucky							
Upgrading........	4.4	1.1	10.6	2.4	24.2	--	42.7
Unmet needs......	26.9	--	--	--		--	26.9
Pop. increase....	5.4	--	3.3	1.9	0.5	7.0	18.1
Total..........	36.7	1.1	13.9	4.3	24.7	7.0	87.7
Louisiana							
Upgrading........	1.2	--	2.7	--	20.3	--	24.2
Unmet needs......	51.0	4.6	10.7	--	26.6	--	92.9
Pop. increase....	3.3	1.0	8.2	3.6	3.3	9.9	29.3
Total..........	55.5	5.6	21.6	3.6	50.2	9.9	146.4

Continued--

Table 27. Required Capital Outlays[a/] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73
(in million current dollars)
--Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Maine							
Upgrading........	3.5	0.4	2.5	--	0.2	--	6.6
Unmet needs......	9.9	8.3	5.9	10.1	--	--	34.2
Pop. increase....	--	0.2	--	0.7	--	0.0	0.9
Total..........	13.4	8.9	8.4	10.8	0.2	--	41.7
Maryland							
Upgrading........	4.4	0.3	2.1	5.1	0.1	--	12.0
Unmet needs......	20.1	3.9	25.0	--	--	--	49.0
Pop. increase....	1.7	2.4	9.2	10.4	--	--	23.7
Total..........	26.2	6.6	36.3	15.5	0.1	--	84.7
Massachusetts							
Upgrading........	61.2	4.2	11.7	--	59.5	--	136.6
Unmet needs......	--	--	--	92.4	--	--	92.4
Pop. increase....	0.3	0.3	2.4	9.0	--	--	12.0
Total..........	61.5	4.5	14.1	101.4	59.5	--	241.0
Michigan							
Upgrading........	27.3	8.2	43.1	10.4	157.1	--	246.1
Unmet needs......	159.0	--	--	--	--	--	159.0
Pop. increase....	4.2	1.1	0.1	15.5	1.4	21.9	44.2
Total..........	190.5	9.3	43.2	25.9	158.5	21.9	449.3
Minnesota							
Upgrading........	9.9	2.6	5.4	--	53.3	--	71.2
Unmet needs......	22.4	13.5	--	--	--	--	35.9
Pop. increase....	3.3	2.4	7.8	7.1	--	0.4	21.0
Total..........	35.6	18.5	13.2	7.1	53.3	0.4	128.1

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 6-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Mississippi							
Upgrading........	3.2	0.3	--	--	--	--	3.5
Unmet needs......	--	7.6	1.8	10.2	7.7	--	27.3
Pop. increase....	0.9	2.4	1.6	2.2	3.4	0.0	10.5
Total..........	4.1	10.3	3.4	12.4	11.1	--	41.3
Missouri							
Upgrading........	2.5	1.0	8.4	2.5	--	--	14.4
Unmet needs......	20.2	15.4	14.3	76.6	--	--	126.6
Pop. increase....	2.5	5.6	4.1	4.4	--	5.1	21.7
Total..........	25.2	22.0	26.8	83.6	--	5.1	162.7
Montana							
Upgrading........	1.9	1.5	8.9	3.0	2.3	--	17.6
Unmet needs......	--	--	--	0.1	--	--	0.1
Pop. increase....	0.8	--	0.1	1.6	--	0.3	2.8
Total..........	2.7	1.5	9.0	4.7	2.3	0.3	20.5
Nebraska							
Upgrading........	4.2	1.6	4.8	--	9.0	--	19.6
Unmet needs......	--	--	--	--	4.6	--	4.6
Pop. increase....	--	0.8	0.1	0.4	2.5	0.8	4.6
Total..........	4.2	2.4	4.9	0.4	16.1	0.8	28.8
Nevada							
Upgrading........	0.9	--	--	--	--	--	0.9
Unmet needs......	--	--	0.3	--	--	--	0.3
Pop. increase....	--	--	1.4	4.7	--	0.9	7.0
Total..........	0.9	--	1.7	4.7	--	0.9	8.2

Continued--

(7)

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73
(in million current dollars)
--Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
New Hampshire							
Upgrading........	2.8	0.3	2.8	2.2	--	--	8.1
Unmet needs......	0.3	5.0	2.5	9.7	--	--	17.5
Pop. increase....	--	1.3	--	1.4	--	0.0	2.7
Total..........	3.1	6.6	5.3	13.3	--	--	28.3
New Jersey							
Upgrading........	9.7	5.4	18.6	26.4	124.6	--	184.7
Unmet needs......	59.5	47.0	57.2	14.6	--	--	178.3
Pop. increase....	--	5.1	22.2	25.2	--	--	52.5
Total..........	69.2	57.5	98.0	66.2	124.6	--	415.5
New Mexico							
Upgrading........	0.9	--	--	--	--	--	0.9
Unmet needs......	2.9	--	--	2.0	1.2	--	6.1
Pop increase....	0.1	--	2.1	0.1	4.5	2.6	9.4
Total..........	3.9	--	2.1	2.1	5.7	2.6	16.4
New York							
Upgrading........	79.9	23.1	58.9	44.5	89.2	--	295.6
Unmet needs......	218.0	37.2	50.2	87.2	41.3	--	433.9
Pop. increase....	4.4	9.2	31.0	24.0	--	23.6	92.2
Total..........	302.3	69.5	140.1	155.7	130.5	23.6	821.7
North Carolina							
Upgrading........	15.3	1.6	0.3	--	--	--	17.2
Unmet needs......	--	--	--	7.3	17.0	--	24.3
Pop. increase....	2.5	1.2	0.5	3.8	7.5	1.0	16.5
Total..........	17.8	2.8	0.8	11.1	24.5	1.0	58.0

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73
(in million current dollars)
--Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
North Dakota							
Upgrading........	2.8	--	--	--	--	--	2.8
Unmet needs......	--	--	--	4.5	--	--	4.5
Pop. increase....	--	--	--	0.9	--	--	0.9
Total..........	2.8	--	--	5.4	--	--	8.2
Ohio							
Upgrading........	22.0	13.0	38.0	13.2	47.1	--	133.3
Unmet needs......	107.2	19.3	6.7	14.1	--	--	147.3
Pop. increase....	4.9	5.5	14.2	9.2	1.9	19.1	54.8
Total..........	134.1	37.8	58.9	36.5	49.0	19.1	335.4
Oklahoma							
Upgrading........	3.2	--	1.6	1.7	4.6	--	11.1
Unmet needs......	--	--	--	--	6.2	--	6.2
Pop. increase....	0.1	1.3	1.5	3.3	4.4	0.6	11.2
Total..........	3.3	1.3	3.1	5.0	15.2	0.6	28.5
Oregon							
Upgrading........	6.4	4.1	2.9	--	19.5	--	32.9
Unmet needs......	46.3	--	--	--	--	--	46.3
Pop. increase....	1.0	1.9	4.0	1.7	--	12.0	20.6
Total..........	53.7	6.0	6.9	1.7	19.5	12.0	99.8
Pennsylvania							
Upgrading........	14.9	16.7	41.7	--	89.8	--	163.1
Unmet needs......	30.0	--	--	--	--	--	30.0
Pop increase.....	1.7	1.6	6.9	10.8	--	--	21.0
Total..........	46.6	18.3	48.6	10.8	89.8	--	214.1

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Rhode Island							
Upgrading........	0.2	0.8	1.4	3.4	4.5	--	10.3
Unmet needs......	12.3	--	--	6.7	--	--	19.0
Pop. increase....	--	--	1.2	1.1	--	--	2.3
Total..........	12.5	0.8	2.6	11.2	4.5	--	31.6
South Carolina							
Upgrading........	14.0	1.6	5.0	--	--	--	20.6
Unmet needs......	26.2	--	--	12.3	--	--	38.5
Pop. increase....	0.1	0.2	0.2	2.6	--	9.0	12.1
Total..........	40.3	1.8	5.2	14.9	--	9.0	71.2
South Dakota							
Upgrading........	3.6	1.0	0.8	--	--	--	5.4
Unmet needs......	--	--	--	--	--	--	--
Pop. increase....	0.3	--	0.6	0.9	--	0.0	1.8
Total..........	3.9	1.0	1.4	0.9	--	--	7.2
Tennessee							
Upgrading........	6.5	2.6	6.7	--	5.2	--	21.0
Unmet needs......	27.6	1.2	17.1	9.1	18.3	--	73.3
Pop. increase....	2.9	--	10.0	0.5	2.4	3.3	19.1
Total..........	37.0	3.8	33.8	9.6	25.9	3.3	113.4
Texas							
Upgrading........	17.3	0.9	--	--	0.1	--	18.3
Unmet needs......	--	--	--	60.1	26.3	--	86.4
Pop. increase....	6.7	0.7	5.0	16.8	39.1	--	68.3
Total..........	24.0	1.6	5.0	76.9	65.5	--	173.0

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants, by Function and Size of Community for Individual States, 5-Year Period, 1969-73
(in million current dollars)
--Continued

State and Function	Size of community						
	Less than 5,000	5,000-9,999	10,000-24,999	25,000-99,999	100,000 and over	Unknown	Total
Utah							
Upgrading........	2.6	--	--	--	--	--	2.6
Unmet needs......	22.4	6.4	--	63.9	2.0	--	94.7
Pop. increase....	--	1.6	2.6	1.8	0.1	5.3	11.4
Total..........	25.0	8.0	2.6	65.7	2.1	5.3	108.7
Vermont							
Upgrading........	3.6	0.4	6.8	--	--	--	10.8
Unmet needs......	--	3.0	--	0.1	--	--	3.1
Pop. increase....	--	1.0	--	0.1	--	--	1.1
Total..........	3.6	4.4	6.8	0.2	--	--	15.0
Virginia							
Upgrading........	9.2	4.2	11.2	3.1	42.6	--	70.3
Unmet needs......	50.8	--	--	--	1.8	--	52.6
Pop. increase....	--	--	3.8	2.8	12.3	7.5	26.4
Total..........	60.0	4.2	15.0	5.9	56.7	7.5	149.3
Washington							
Upgrading........	12.3	3.8	18.2	--	6.6	--	40.9
Unmet needs......	67.9	--	--	--	31.3	--	99.2
Pop. increase....	2.2	2.7	2.9	0.1	2.6	10.5	21.0
Total..........	82.4	6.5	21.1	0.1	40.5	10.5	161.1
West Virginia							
Upgrading........	8.6	4.6	5.9	8.3	0.1	--	27.5
Unmet needs......	5.1	--	--	9.7	--	--	14.8
Pop. increase....	0.2	--	0.6	0.6	--	0.9	2.3
Total..........	13.9	4.6	6.5	18.6	0.1	0.9	44.6

Continued--

Table 27. Required Capital Outlays[a] for Municipal Waste Treatment Plants. by Function and Size of Community for Individual States, 5-Year Period, 1969-73 (in million current dollars) --Continued

State and Function	Size of community: Less than 5,000	5,000-9,999	10,000 24,999	25,000 99,999	100,000 and over	Unknown	Total
Wisconsin							
Upgrading.......	16.9	1.3	11.9	12.3	9.2	--	51.6
Unmet needs.....	--	--	--	3.7	--	--	3.7
Pop. increase...	0.8	4.1	3.8	4.1	4.7	--	17.5
Total.........	17.7	5.4	15.7	20.1	13.9	--	72.8
Wyoming							
Upgrading.......	0.5	0.8	3.4	--	--	--	4.7
Unmet needs.....	--	--	--	0.6	--	--	0.6
Pop. increase...	--	--	0.5	0.9	--	--	1.4
Total.........	0.5	0.8	3.9	1.5	--	--	6.7
United States							
Upgrading.......	508.0	138.3	493.9	208.5	1,307.8	--	2,656.5
Unmet needs.....	1,654.3	211.3	221.5	813.7	253.1	--	3,153.9
Pop. increase...	85.1	84.6	236.1	327.1	193.1	237.2	1,163.2
Total.........	2,247.4	434.2	951.5	1,349.3	1,754.0	237.2	6,973.6

---

a/ Excluding depreciation allowances.

b/ Upgrading less than adequate facilities.

c/ Elimination of current unmet needs.

d/ Provision for population and industrial increases.

Source: U. S. Department of Interior, Federal Water Pollution Control Administration unpublished data, adjusted to current dollars.

Table 28. Sanitary Sewers and Municipal Waste Treatment Facilities, Required Capital Outlays, Net Cost to State and Local Governments, Assuming 55 Percent Federal Grants for Treatment Facilities, 1969-73

(in millions of current dollars)

State	1969	1970	1971	1972	1973	Total 1969-73
Alabama:						
Tr......	9.3	9.6	10.0	10.4	10.9	50.2
Sw......	13.3	13.6	13.9	14.2	14.5	69.5
Total...	22.6	23.2	23.9	24.6	25.4	119.7
Alaska:						
Tr......	0.9	0.9	1.0	1.1	1.3	5.2
Sw......	1.6	1.7	1.7	1.8	1.9	8.7
Total...	2.5	2.6	2.7	2.9	3.2	13.9
Arizona:						
Tr......	5.0	5.4	5.7	6.0	6.4	28.5
Sw......	27.5	28.3	29.1	29.9	30.8	145.6
Total...	32.5	33.7	34.8	35.9	37.2	174.1
Arkansas:						
Tr......	3.0	3.1	3.3	3.5	3.7	16.6
Sw......	5.0	5.2	5.4	5.5	5.7	26.8
Total...	8.0	8.3	8.7	9.0	9.4	43.4
California:						
Tr......	105.3	111.3	117.8	125.0	132.7	592.1
Sw......	242.4	250.4	258.6	267.1	275.8	1,294.3
Total...	347.7	361.7	376.4	392.1	408.5	1,886.4
Colorado:						
Tr......	6.3	6.7	6.9	7.2	7.6	34.7
Sw......	10.7	11.1	11.5	11.9	12.3	57.5
Total...	17.0	17.8	18.4	19.1	19.9	92.2
Connecticut:						
Tr......	13.5	14.2	15.0	15.9	16.7	75.3
Sw......	25.8	26.7	27.5	28.5	29.4	137.9
Total...	39.3	40.9	42.5	44.4	46.1	213.2
Delaware:						
Tr......	2.2	2.3	2.4	2.5	2.6	12.0
Sw......	4.0	4.1	4.2	4.3	4.4	21.0
Total...	6.2	6.4	6.6	6.8	7.0	33.0

Tr = Municipal water waste facilities
Sw = Sanitary sewers

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-73
District of Columbia:						
Tr......	1.0	1.1	1.1	1.1	1.2	5.5
Sw......	11.0	11.8	11.8	12.1	12.5	58.8
Total...	12.0	12.5	12.9	13.2	13.7	64.3
Florida:						
Tr......	32.1	33.6	35.3	37.4	39.6	178.0
Sw......	75.5	77.5	79.4	81.5	83.6	397.5
Total...	107.6	111.1	114.7	118.9	123.2	575.5
Georgia:						
Tr......	14.7	15.3	16.0	16.7	17.4	80.1
Sw......	21.3	21.9	22.4	23.0	23.5	112.1
Total...	36.0	37.2	38.4	39.7	40.9	192.2
Hawaii:						
Tr......	3.7	4.0	4.3	4.5	4.9	21.4
Sw......	15.1	15.7	16.2	16.8	17.4	81.2
Total...	18.8	19.7	20.5	21.3	22.3	102.6
Idaho:						
Tr......	1.7	1.7	1.8	1.9	2.0	9.1
Sw......	1.8	1.9	1.9	2.0	2.1	9.7
Total...	3.5	3.6	3.7	3.9	4.1	18.8
Illinois:						
Tr......	25.0	26.2	27.6	29.1	30.7	138.6
Sw......	43.2	44.4	45.6	46.8	48.0	228.0
Total...	68.2	70.6	73.2	75.9	78.7	366.6
Indiana:						
Tr......	11.7	12.3	13.0	13.6	14.4	65.0
Sw......	13.8	14.2	14.6	15.0	15.4	73.0
Total...	25.5	26.5	27.6	28.6	29.8	138.0
Iowa:						
Tr......	4.1	4.3	4.5	4.6	4.9	22.4
Sw......	2.6	2.6	2.7	2.8	2.8	13.5
Total...	6.7	6.9	7.2	7.4	7.7	35.9

Tr = Municipal waste treatment facilities.

Sw = Sanitary sewers.

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-73
Kansas:						
Tr......	3.2	3.2	3.4	3.5	3.6	16.9
Sw......	4.2	4.3	4.4	4.5	4.6	22.0
Total...	7.4	7.5	7.8	8.0	8.2	38.9
Kentucky:						
Tr......	8.4	8.8	9.2	9.7	10.2	46.3
Sw......	10.0	10.3	10.6	10.9	11.3	53.1
Total...	18.4	19.1	19.8	20.6	21.5	99.4
Louisiana:						
Tr......	13.4	14.0	14.8	15.6	16.4	74.2
Sw......	29.5	30.5	31.4	32.4	33.5	157.3
Total...	42.9	44.5	46.2	48.0	49.9	231.5
Maine:						
Tr......	3.6	3.8	4.1	4.3	4.5	20.3
Sw......	0.8	0.8	0.9	0.9	0.9	4.3
Total...	4.4	4.6	5.0	5.2	5.4	24.6
Maryland:						
Tr......	8.3	8.8	9.5	10.1	10.8	47.5
Sw......	23.8	24.6	25.4	26.2	27.0	127.0
Total...	32.1	33.4	34.9	36.3	37.8	174.5
Massachusetts:						
Tr......	22.7	23.5	24.5	25.6	26.6	122.9
Sw......	41.2	42.3	43.4	44.6	45.8	217.3
Total...	63.9	65.8	67.9	70.2	72.4	340.2
Michigan:						
Tr......	41.4	43.4	45.5	47.9	50.5	228.7
Sw......	39.4	40.5	41.5	42.7	43.8	207.9
Total...	80.8	83.9	87.0	90.6	94.3	436.6
Minnesota:						
Tr......	12.5	13.1	13.7	14.4	15.1	68.8
Sw......	15.4	15.9	16.3	16.8	17.2	81.6
Total...	27.9	29.0	30.0	31.2	32.3	150.4

Tr = Municipal waste treatment facilities.
Sw = Sanitary sewers

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-73
Mississippi:						
Tr......	3.7	3.9	4.1	4.4	4.6	20.7
Sw......	8.5	8.8	9.1	9.3	9.9	45.6
Total...	12.2	12.7	13.2	13.7	14.5	66.3
Missouri:						
Tr......	14.5	15.3	16.2	17.2	18.3	81.5
Sw......	60.3	62.1	63.6	66.4	68.8	321.2
Total...	74.8	77.4	79.8	83.6	87.1	402.7
Montana:						
Tr......	1.9	2.0	2.1	2.3	2.3	10.6
Sw......	1.1	1.2	1.2	1.3	1.3	6.1
Total...	3.0	3.2	3.3	3.6	3.6	16.7
Nebraska:						
Tr......	3.0	3.2	3.3	3.4	3.6	16.5
Sw......	3.6	3.7	3.7	3.8	3.9	18.7
Total...	6.6	6.9	7.0	7.2	7.5	35.2
Nevada:						
Tr......	1.0	1.0	1.1	1.2	1.3	5.6
Sw......	3.3	3.4	3.5	3.7	3.8	17.7
Total...	4.3	4.4	4.6	4.9	5.1	23.3
New Hampshire:						
Tr......	2.5	2.7	2.8	2.9	3.0	13.9
Sw......	3.9	4.0	4.1	4.2	4.3	20.5
Total...	6.4	6.7	6.9	7.1	7.3	34.4
New Jersey:						
Tr......	38.5	40.5	42.6	44.9	47.5	214.0
Sw......	79.6	82.1	84.8	87.2	90.1	423.8
Total...	118.1	122.6	127.4	132.1	137.6	637.8
New Mexico:						
Tr......	2.0	2.1	2.2	2.3	2.4	11.0
Sw......	6.8	7.0	7.2	7.5	7.7	36.2
Total...	8.8	9.1	9.4	9.8	10.1	47.2

Tr = Municipal waste treatment facilities.
Sw = Sanitary sewers.

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-7
New York:						
Tr......	73.9	77.9	82.3	87.2	92.4	413.7
Sw......	131.5	135.8	140.1	144.7	149.4	701.5
Total...	205.4	213.7	222.4	231.9	241.8	1,115.2
No. Carolina:						
Tr......	6.5	6.8	7.1	7.5	7.8	35.7
Sw......	15.6	16.0	16.4	16.8	17.2	82.0
Total...	22.1	22.8	23.5	24.3	25.0	117.7
No. Dakota:						
Tr......	0.9	0.9	0.9	1.0	1.1	4.8
Sw......	1.0	1.1	1.1	1.1	1.1	5.4
Total...	1.9	2.0	2.0	2.1	2.2	10.2
Ohio:						
Tr......	33.3	34.8	36.6	38.5	40.5	183.7
Sw......	50.8	52.3	53.8	55.3	60.0	272.2
Total...	84.1	87.1	90.4	93.8	100.5	455.9
Oklahoma:						
Tr......	3.7	3.8	4.0	4.2	4.4	20.1
Sw......	8.7	8.9	9.1	9.4	9.6	45.7
Total...	12.4	12.7	13.1	13.6	14.0	65.8
Oregon:						
Tr......	9.2	9.7	10.3	10.9	11.6	51.7
Sw......	13.8	14.2	14.6	15.1	15.5	73.2
Total...	23.0	23.9	24.9	26.0	27.1	124.9
Pennsylvania:						
Tr......	24.4	25.2	26.2	27.2	28.4	131.4
Sw......	9.5	9.7	10.0	10.3	10.6	50.1
Total...	33.9	34.9	36.2	37.5	39.0	181.5
Puerto Rico:						
Tr......						--
Sw......						--
Total...						--

Tr = Municipal waste treatment facilities.
Sw = Sanitary sewers.

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-73
Rhode Island:						
Tr......	3.1	3.2	3.4	3.5	3.7	16.9
Sw......	6.8	6.9	7.1	7.3	7.5	35.6
Total...	9.9	10.1	10.5	10.8	11.2	52.5
So. Carolina:						
Tr......	6.8	7.1	7.4	7.7	8.1	37.1
Sw......	7.1	7.3	7.4	7.6	7.8	37.2
Total...	13.9	14.4	14.8	15.3	15.9	74.3
So. Dakota:						
Tr......	0.9	0.9	0.9	1.0	1.1	4.8
Sw......	0.8	0.8	0.9	0.9	0.9	4.3
Total...	1.7	1.7	1.8	1.9	2.0	9.1
Tennessee:						
Tr......	10.5	11.0	11.6	12.2	12.8	58.1
Sw......	13.6	14.0	14.3	14.7	15.1	71.7
Total...	24.1	25.0	25.9	26.9	27.9	129.8
Texas:						
Tr......	20.2	21.0	21.9	22.9	24.0	110.0
Sw......	77.6	79.5	81.4	83.4	85.5	407.4
Total...	97.8	100.5	103.3	106.3	109.5	517.4
Utah:						
Tr......	9.7	10.1	10.6	11.2	11.7	53.3
Sw......	10.5	10.9	11.3	11.6	12.0	56.3
Total...	20.2	21.0	21.9	22.8	23.7	109.6
Vermont:						
Tr......	1.4	1.5	1.5	1.5	1.7	7.6
Sw......	0.4	0.4	0.4	0.4	0.5	22.1
Total...	1.8	1.9	1.9	1.9	2.2	9.7
Virginia:						
Tr......	13.9	14.4	15.0	15.7	16.4	75.4
Sw......	22.7	23.4	24.2	24.9	25.8	121.0
Total...	36.6	37.8	39.2	40.6	42.2	196.4

Tr = Municipal waste treatment facilities.
Sw = Sanitary sewers.

Table 28. continued

State	1969	1970	1971	1972	1973	Total 1969-73
Washington:						
Tr......	14.4	15.3	16.2	17.1	18.3	81.3
Sw......	38.4	39.6	40.8	42.0	43.2	204.0
Total...	52.8	54.9	57.0	59.1	61.5	285.3
West Virginia:						
Tr......	4.1	4.3	4.5	4.6	4.9	22.4
Sw......	2.8	2.9	3.0	3.1	3.2	15.0
Total...	6.9	7.2	7.5	7.7	8.1	37.4
Wisconsin:						
Tr......	8.5	8.9	9.2	9.7	10.1	46.4
Sw......	9.2	9.5	9.7	9.9	10.2	48.5
Total...	17.7	18.4	18.9	19.6	20.3	94.9
Wyoming:						
Tr......	0.7	0.8	0.8	0.9	0.9	4.1
Sw......	0.9	1.0	1.0	1.0	1.1	5.0
Total...	1.6	1.8	1.8	1.9	2.0	9.1
TOTAL U.S.						
Tr......	666.2	698.9	735.2	774.7	817.6	3,692.6
Sw......	1,267.7	1,306.4	1,344.2	1,385.1	1,430.2	6,733.6
Total...	1,933.9	2,005.3	2,079.4	2,159.8	2,247.8	10,426.2

Tr = Municipal waste treatment facilities.
Sw = Sanitary sewers.

Source: Calculated from U.S. Dept. of Interior, Federal Water Pollution Control Administration, unpublished data in constant dollars, adjusted to current dollars on the basis of projected construction cost increases.

Table 29. Municipal Waste Treatment Facilities, Average Annual Construction Contract Awards, 1962-66, and Average Annual Required Capital Outlays, Net Cost to Local Governments, Assuming Varying Levels of State and Federal Grants, 1969-73

(in millions of current dollars)

State	Average Annual Contract Awards, 1962-66	Average Annual Required Capital Outlays 1969-73			
			Net Cost to Local Governments, Assumed Combined Levels of State and Federal Grants of		
		Total	30% of Total[a]	70% of Total[b]	80% of Total[c]
Alabama	6.9	22.3	15.6	6.7	4.5
Alaska	0.7	2.4	1.7	.7	.5
Arizona	5.2	12.7	8.9	3.8	2.5
Arkansas	7.2	7.4	5.2	2.2	1.5
California	37.6	263.1	184.2	78.9	52.6
Colorado	8.1	15.4	10.8	4.6	3.1
Connecticut	8.7	33.5	23.5	10.0	6.7
Delaware	2.2	5.3	3.7	1.6	1.1
District of Columbia	7.0	2.5	1.7	.8	0.5
Florida	14.0	79.1	55.4	23.7	15.8
Georgia	9.5	35.6	24.9	10.7	7.1
Hawaii	5.6	9.5	6.7	2.8	1.9
Idaho	1.1	4.1	2.9	1.2	0.8
Illinois	33.3	61.6	43.1	18.5	12.3
Indiana	17.1	28.9	20.2	8.7	5.8
Iowa	7.5	10.0	7.0	3.0	2.0
Kansas	5.5	7.5	5.3	2.3	1.5
Kentucky	8.7	20.6	14.4	6.2	4.1
Louisiana	13.0	33.0	23.1	9.9	6.6
Maine	3.4	9.0	6.3	2.7	1.8
Maryland	12.7	21.1	14.8	6.3	4.2
Massachusetts	13.5	54.6	38.2	16.4	10.9
Michigan	23.3	101.7	71.2	30.5	20.4
Minnesota	13.4	30.5	21.4	9.1	6.1
Mississippi	5.2	9.2	6.4	2.8	1.8
Missouri	22.1	36.2	25.3	10.9	7.2
Montana	1.4	4.7	3.3	1.4	0.9
Nebraska	5.1	7.3	5.1	2.2	1.5
Nevada	3.6	2.5	1.7	0.8	0.5

continued --

Table 29. Municipal Waste Treatment Facilities, Average Annual Construction Contract Awards, 1962-66, and Average Annual Required Capital Outlays, Net Cost to Local Governments, Assuming Varying Levels of State and Federal Grants, 1969-73
continued --

(in millions of current dollars)

State	Average Annual Contract Awards, 1962-66	Average Annual Required Capital Outlays 1969-73			
			Net Cost to Local Governments, Assumed Combined Levels of State and Federal Grants of		
		Total	30% of Total a/	70% of Total b/	80% of Total c/
New Hampshire	3.2	6.2	4.3	1.9	1.2
New Jersey	18.8	95.1	66.6	28.5	19.0
New Mexico	4.4	4.9	3.4	1.5	1.0
New York	42.3	183.9	128.7	55.2	36.8
North Carolina	16.6	15.9	11.1	4.8	3.2
North Dakota	1.1	2.2	1.5	0.7	0.4
Ohio	25.3	81.7	57.2	24.5	16.4
Oklahoma	4.7	8.9	6.2	2.7	1.8
Oregon	5.8	22.9	16.0	6.9	4.6
Pennsylvania	27.4	58.5	40.9	17.5	11.7
Puerto Rico	2.2				
Rhode Island	2.8	7.5	5.3	2.2	1.5
South Carolina	5.5	16.5	11.6	4.9	3.3
South Dakota	1.5	2.1	1.5	0.6	0.4
Tennessee	10.9	25.8	18.1	7.7	5.2
Texas	22.0	48.9	34.2	14.7	9.8
Utah	2.9	23.7	16.6	7.1	4.7
Vermont	3.5	3.1	2.2	0.9	0.6
Virginia	11.7	33.6	23.5	10.1	6.7
Washington	21.0	36.1	25.3	10.8	7.2
West Virginia	6.4	9.9	6.9	3.0	2.0
Wisconsin	20.1	20.6	14.4	6.2	4.1
Wyoming	0.3	1.8	1.3	0.5	0.4
Total U. S.	563.0	1,641.1	1,148.8	492.3	328.2

---

a/ 30% Federal grants, no State grants.

b/ 40% Federal grants, 30% State grants.

c/ 55% Federal grants, 25% State grants.

Sources: Average annual contract awards, 1962-66 calculated from U. S. Department of Interior, Federal Water Pollution Control Administration, WP-15 Series Publication, Table 4. Average annual required capital outlays, 1969-73 calculated from U. S. Department of Interior, FWPCA, unpublished data in constant dollars, adjusted to current dollars on the basis of projected construction cost increases.